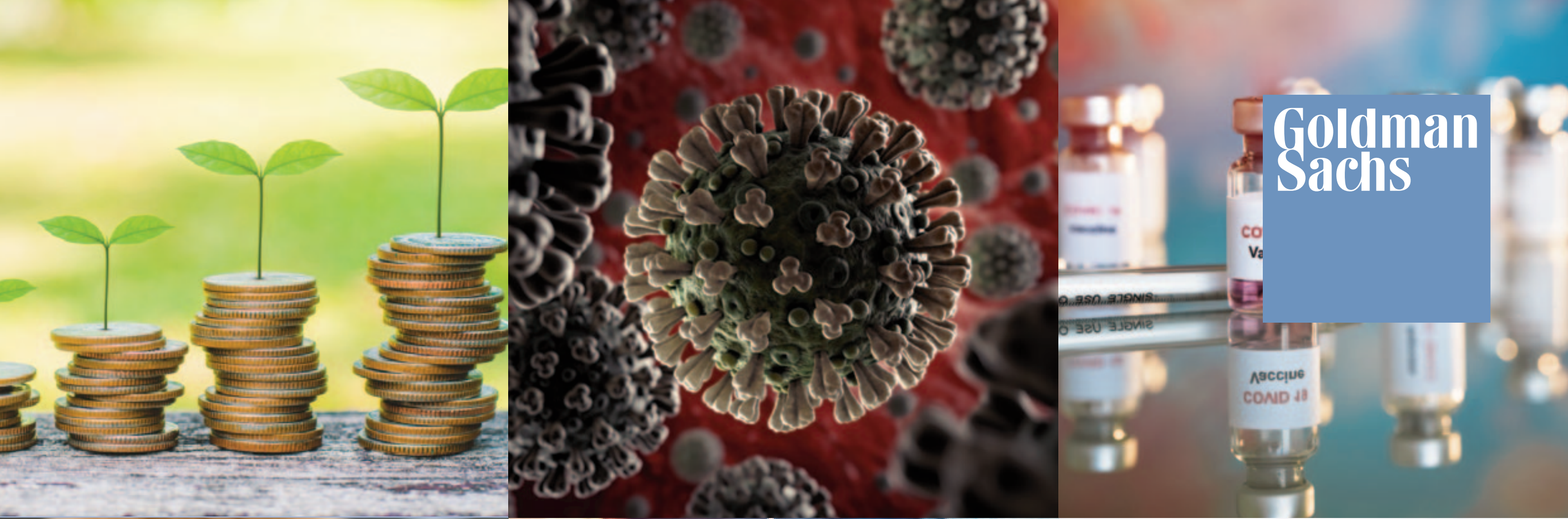

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TOP of MIND

2020 UPDATE, AND A PEEK AT 2021

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2020 in review

Click the icon to access the original report.

In the words of our 2020 interviewees

"It doesn't do any good to think about what's going to happen to the economy, or for how long the stock market is going to decline or to how low. These things are unknowable. What really matters is whether price is proportional to fundamentals. It's all about value."
– Howard Marks, Co-Founder and Co-Chairman, Oaktree Capital Management
(Issue 87, March 24)

"When you step back, recent [oil] developments are a …culmination of an unsustainable supply management strategy that is coinciding with an enormous demand shock, and the answer has to be low prices."
– Gary Ross, CEO of Black Gold Investors and Founder of PIRA Energy Group
(Issue 88, March 31)

"If you focus on the level [of activity], you might say that we assume a U-shaped recovery. But if you focus on growth rates, you'd probably call our forecast V-shaped. . . . But whatever growth we get will come from a much lower level."
– Jan Hatzius, GS Chief Economist and Head of Global Investment Research
(Issue 87, March 24)

"In regards to both the transmission and severity of cases, this could be a very significant event."
– Dr. Michael Osterholm, Director of the Center for Infectious Disease Research and Policy, University of Minnesota
(Issue 86, February 28)

"The key [to ESG investing] is to clear out preconceptions and treat ESG like any other investing question, which requires forming a clear investment thesis."
– John Goldstein, GS Head of Sustainable Finance Group
(Issue 85, January 30)

"The whole point of having a strong balance sheet is to be able to use debt aggressively when you're faced with a full-on crisis. And this is one where I would have no problem with policymakers taking the same actions twice over if it means we get out of this in one piece."
– Kenneth Rogoff, Professor, Harvard University
(Issue 90, May 28)

"In many parts of the world, the virus still has a lot of room to run until we reach enough infections that herd immunity starts to slow virus spread."
– Dr. Marc Lipsitch, Professor, Harvard T.H. Chan School of Public Health
(Issue 92, August 13)

"The sense is that this infection will probably spread worldwide… stringent control measures… won't stop an epidemic, but they will slow it down and ultimately reduce the total number of cases."
– Dr. Barry Bloom, Professor, Harvard T.H. Chan School of Public Health
(Issue 86, February 28)

"You don't want to wait for that exponential growth to show up in the numbers before reimposing some restrictions."
– Dr. Zeke Emanuel, Vice Provost of Global Initiatives, University of Pennsylvania
(Issue 89, April 28)

"One of the lessons we learned from the financial crisis is that you can see extraordinary action at the peak moments of crisis, but even when things are still quite bad, people can tire of taking action, and not want to do anymore."
– Jason Furman, Professor, Harvard School of Government
(Issue 87, March 24)

"It's not just the rate of global growth that matters for the Dollar's value, it's how global growth compares to US growth."
– Barry Eichengreen, Professor, University of California, Berkeley
(Issue 94, October 29)

"[Under President Biden] higher taxes will be critical to pay for the more permanent measures required to make our economy, cities, and people more resilient to adverse shocks… But I don't believe these narrowly targeted taxes will hurt the economy, especially when we net out the benefits from what they're paying for."
– Jared Bernstein, economic adviser to President-elect Joe Biden
(Issue 93, October 1)

"Without a doubt, the most pressing [foreign policy challenge over the next four years] will be the US-China relationship, and more broadly, the future orientation of global technology and data."
– Ian Bremmer, President and Founder, Eurasia Group
(Issue 93, October 1)

"If we end up choosing policies that are expensive, we're going to run out of enthusiasm before we've made substantial progress against climate change… carbon pricing is our best bet to achieve carbon reductions on the cheap."
– Michael Greenstone, Director of the Energy Policy Institute at the University of Chicago
(Issue 85, January 30)

"In some ways, the rise in the incidence of non-work represents the most fundamental change in the outcomes for men, and Black men in particular, in this country in many decades. And it suggests that just focusing on "earnings" gaps… presents an increasingly poor picture of what's happening in the population overall."
– Kerwin K. Charles, Dean and Professor, Yale School of Management
(Issue 91, July 16)

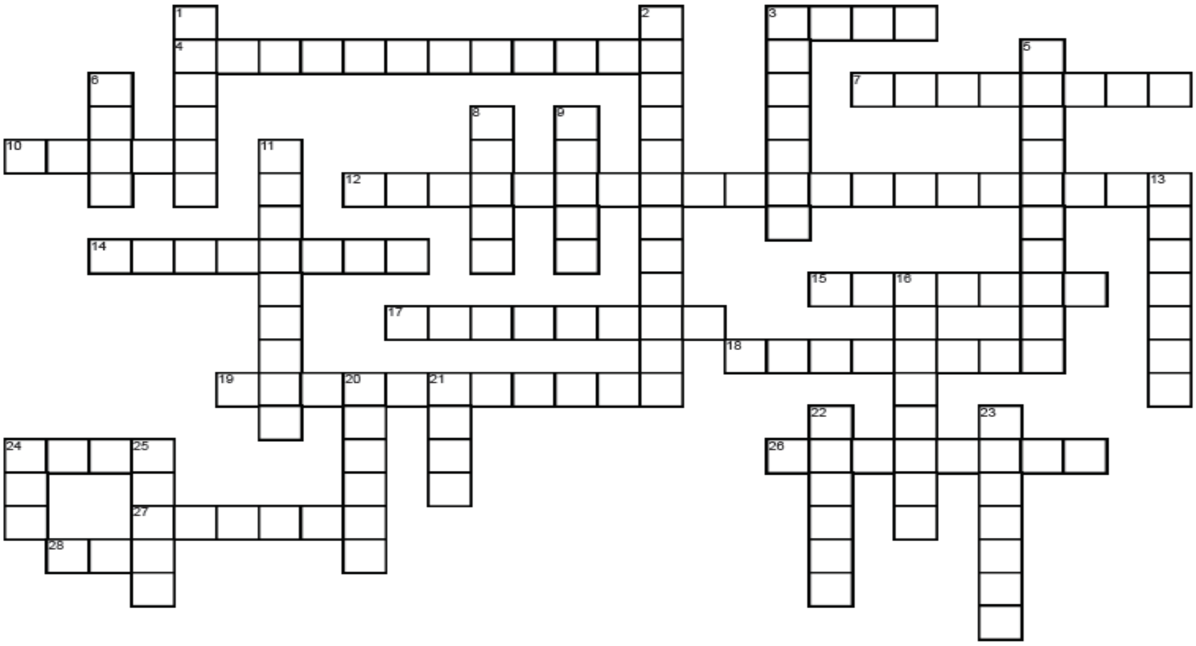
"History shows that President Putin doesn't respond to sanctions. Sanctions just strengthen the relationship between China and Russia that has been developing in common cause against what they see as US unilateralism."
– Daniel Yergin, Vice Chairman of IHS Markit
(Issue 88, March 31)

"By all logic, the Dollar's dominance in the global monetary system should be declining… But the reality is that the Dollar's position remains as dominant as ever."
– Eswar Prasad, Professor, Cornell University
(Issue 94, October 29)

"When we initiated our COVID-19 vaccine development program in late January 2020, we ambitiously set a target of 12 to 18 months for the availability of a vaccine at scale. Six months into the development effort, we're still on target for the first half of 2021."
– Dr. Richard Hatchett, CEO, Coalition for Epidemic Preparedness Innovations
(Issue 92, August 13)

Note: All quotes came from interviews that appeared in GS Top of Mind reports in 2020.
Source: Goldman Sachs Global Investment Research.

Revisiting 2020 themes, crossword-style



Across:

3. The Fed cut interest rates by 150bp in 2020, which compares to average easing of ____hundred bp during post-war recessions (Issue 87).
4. Testing, ____, and vaccines are all critical parts of the medical response to the coronavirus (Issue 89).
7. The WHO uses this term for a major infectious disease that spreads within communities on multiple continents (Issue 86).
10. There are currently 18 vaccines globally in this phase of large-scale efficacy tests and 7 have been approved for limited use (Issue 92).
12. Eswar Prasad, Professor at Cornell University, argues that the ____ of the RMB was likely never an end goal for Chinese policymakers in itself, and certainly isn't one today (Issue 94).
14. Barry Eichengreen, Professor at the University of California, Berkeley, believes that the Dollar's global status has been modestly ____ for the US (Issue 94).
15. Alec Phillips, GS Chief Political Economist, argued that a Biden administration with a divided Congress—the most likely election outcome at this point—would likely result in only ____ changes to fiscal policy (Issue 93).
17. Jan Hatzius thinks it's hard to see how larger _____ would lead to weaker growth; if anything the causation runs in the other direction, in his view, especially in the near term (Issue 90).
18. According to Dr. Mark McClellan, former FDA commissioner and Director of the Duke-Margolis Center for Health Policy, this type of testing is critical not only for measuring the extent of virus exposure in different communities, but also to better understand whether past infection provides sustained immunity (Issue 89).
19. Howard Marks, Co-Founder and Co-Chairman of Oaktree Capital Management, said it's best to buy when people are ____ (Issue 87).
24. Daniel Yergin, Vice Chairman of IHS Markit, argues that while ____ is still important as a framework for oil producers, the future of the oil market will be determined by Saudi Arabia, Russia and the US (Issue 88).
26. Jared Bernstein, economic adviser to President-elect Joe Biden, notes that increasing the federal government's share of ____ spending was one of the most effective economic relief policies with the biggest multiplier in his experience (Issue 93).
27. Both Gary Ross and Daniel Yergin argue that Saudi Arabia and ____ would be reasonably well-prepared to weather a sustained period of low oil prices (Issue 88).
28. According to Dr. Michael Osterholm, Director of the Center for Infectious Disease Research and Policy at the University of Minnesota, the US was heading into a "perfect storm" as COVID-19 took hold owing to a lack of domestic supply of critical care drugs and ____. (Issue 86).

Down:

1. According to Sylvia Yeh, co-head of Goldman Sachs Asset Management's Municipal Fixed Income business, ____ are unlikely to default irrespective of their circumstances given that they have broad powers of taxation, can cut their budgets, and continue to have access to capital markets (Issue 90).
2. A large number of coronavirus cases are mild or ____, making it more difficult to contain the spread (Issue 86).
3 Timothy Knowles and Shayne Evans, Co-Founders and Managing Partners of The Academy Group, believe that both increased ____ and a better allocation of ____ is a large part of the solution to improving school quality (Issue 91).
5. The value of the Dollar is typically ____ correlated with the health of the global economy, reflecting the currency's unique international role (Issue 94).
6. Dr. Barry Bloom, Professor at the Harvard School of Public Health, says that current estimates suggest 60-70% of the population will likely need to have protective antibodies to achieve ____ immunity (Issue 89).
8. These type of bonds were first issued in 2007, and issuance has grown over 18x from 2013-2018 (Issue 85).
9. While Kenneth Rogoff, former IMF Chief Economist and Professor at Harvard University, believes a large run-up in deficits and debt makes sense today given the size of the coronavirus shock, he cautions that they're not a free ____ (Issue 90).
11. Many climate change experts argue that it's hard to see a path to a green future that doesn't run through more efficient ____ (Issue 85).
13. Kerwin K. Charles, Dean and Professor at the Yale School of Management, believes that the rise in the incidence of ____ represents the most fundamental change in the economic outcomes of men, and Black men in particular, in this country in many decades (Issue 91).
16. A comprehensive study has shown that one key reason for the persistence of the Black earnings and income gap is that upward income ____ is lower and downward ____ is higher for Black men than for white men (Issue 91).
20. Michael Greenstone, Professor at the University of Chicago, believes that the ____ cost of carbon is the most important number you've never heard of (Issue 85).
21. GS economists have found that ____ mandates can raise the rate of actual ____ usage by 25pp on average (Issue 92).
22. Dr. Richard Hatchett, CEO of the Coalition for Epidemic Preparedness Innovations (CEPI), argues that we still don't know whether there will be sufficient vaccine ____ to achieve global herd immunity next year (Issue 92).
23. Ian Bremmer, President and Founder of Eurasia Group, believes that US policy towards China would likely look fairly similar under a Biden administration as under President Trump, with a ____ approach on issues including technology and trade (Issue 93).
24. Jeff Currie, GS Global Head of Commodities Research, explains that negative ____ prices can occur if abundant supplies overwhelm storage and pipeline capacity (Issue 88).
25. The roughly $2tn _____ Act provided small business loans, relief to affected industries, individual stimulus checks, expanded unemployment insurance, and state fiscal aid, among other provisions (Issue 87).

Puzzle made at http: www.puzzle-maker.com. Solutions on pg. 28.

2020, and a peek at 2021

As we head into year-end, we continue our tradition of taking stock of our **Top of Mind** themes, updating/revisiting our favorite graphics, and highlighting what to look for next year.

In a word, 2020 was unpredictable. A once-in-a-century pandemic took the world by storm. The global economy experienced what's likely the deepest and fastest recession since at least WWII. And yet many equity markets are set to end the year near record highs.

Indeed, the spread of **2020's Black Swan: Coronavirus,** which at last count has sadly infected at least 74 million people and caused more than 1.6 million deaths worldwide, dominated growth, markets, and, of course, our daily lives, throughout the year. The lockdowns in China in Q1, followed by Europe, the US and much of the rest of the world in the spring, caused the global economy to screech to a halt, pushing the world into a uniquely sharp **Recession**—with global activity falling by an estimated 20% from January to the trough in April.

Risky assets collapsed, with the S&P 500 falling by 20% in just 16 trading days (Feb 19 – Mar 12), marking the fastest bear market in history. And commodity markets bore the brunt of the hit; despite OPEC+ finally agreeing to a historic **Oil** production cut in the face of plummeting demand and a tremendous surplus of physical oil supplies with nowhere to go, on April 20 the nearby WTI oil price contract closed at -37.6/bbl—the first negative settle ever.

All of this ignited a massive policy response, with the Fed swiftly cutting rates to the zero lower bound and other central banks with room to cut also doing so. And the Fed, ECB and other central banks expanded existing asset purchase programs and, in some cases, initiated new ones. The Fed also created a number of new facilities to backstop credit markets and ensure market functioning, solidifying its position as the liquidity provider of last resort. On the fiscal side, policymakers implemented fiscal easing much larger than during the Global Financial Crisis—on the order of around 7-8% of global GDP—which pushed global public **Debt** levels to roughly 100% of GDP this year—the highest level on record.

But almost as swiftly as economies shut down, they began to **Reopen**, with the manufacturing and construction sectors—where social distancing and other virus control measures are easier to implement—leading the way. Although the reopening process has been far from smooth, today the GS Effective Lockdown Index implies that global GDP has made up about 75% of the sharp drop that occurred in the first part of the year, and that pandemic-induced shutdowns are now inflicting a roughly 8% drag (vs. 20% at the peak) on growth relative to pre-pandemic levels. This has translated into eye-popping double-digit sequential growth rates in many countries during the second half of the year, with the US in particular expected to realize average quarterly annualized growth of 19% in 2H20.

But a significant further recovery in growth—especially in consumer-facing sectors—will likely require a successful rollout of a COVID-19 **Vaccine** that facilitates the development of herd immunity. With the UK, Canada and the US recently approving the Pfizer-BioNTech vaccine for emergency use—and vaccinations of high-risk groups having already begun—achieving this goal seems increasingly likely.

As for the growth implications of the other key event this year—the US election—we believe that the election of Joe Biden as the next US president, likely alongside a Republican-controlled Senate (with the crucial Senate majority hinging on the outcome of the January 5 Georgia runoff races), suggests that **Post-Election Policies** will be moderately supportive of growth, but not nearly as much as they likely would have been with a Blue Wave election outcome.

All told, assuming large shares of the DM population are vaccinated by mid-2021 and the EM population by the end of 2021, continued but fading fiscal stimulus in most major economies (that will push debt-to-GDP levels even higher), and still dovish monetary policy across the major central banks next year (and beyond; we don't expect first rate hikes by the Fed, ECB and BOE until 2025), we expect above-consensus global growth of 6.3% in 2021, with our growth expectations exceeding consensus in all major economies except China.

This favorable growth backdrop leads us to believe that pro-cyclical assets remain well-positioned heading into 2021, and we expect higher equity and commodity prices, tighter credit spreads, steeper rates curves and a weaker Dollar. But given that the market has already moved in a pro-cyclical direction in response to positive vaccine news, we see the largest potential gains where we see the furthest room to run: commodities, Emerging Market assets, and breakeven inflation. We also see a further 6% decline in the broad trade-weighted **Dollar** index over the next 12 months, with risks skewed toward an even weaker Dollar.

The other places where we expect continued laser-focus by governments, investors and corporates in 2021 and beyond? **Climate,** as Biden begins to implement his climate agenda, the EU Green Taxonomy moves forward, and investment vehicles like green bonds and carbon ETFs (as well as ESG investing products more broadly) continue to proliferate. And **Racial Economic Equality**, given the growing realization by all members of society that achieving such equality is not only a moral imperative, but also essential for the health and vibrancy of our economy and our world more generally.

We thank you for your readership during this very trying year, and wish you a **healthy**, happy, and prosperous 2021.

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Investing in Climate Change

"Addressing climate change is not only compatible with growth and prosperity—it is essential to it. There is no high carbon path to future prosperity."

– Nathaniel Keohane, Senior Vice President, Environmental Defense Fund

Published: January 30, 2020

Where we stand now:

- **Concentrations of atmospheric greenhouse gas are likely to rise again, despite the pandemic-year downturn.** CO_2 emissions will fall by an estimated 4-7% in 2020 due to COVID-19 , but remain high. The world is headed for its warmest five years on record (2015-20); October 2020 average global land and ocean temperature was the 4th highest for October since 1880.
- **The world continues to go green.** As part of the European Green Deal, the EU Parliament voted in favor of a proposal to reduce greenhouse gas emissions by 50-55% by 2030, a significant step up from the previous 40% target. And the EU has adopted the Green Taxonomy Regulation, which we see as the most developed global system for classifying the sustainability of economic activities. China has taken a net-zero emissions pledge to achieve carbon neutrality before 2060. And while the US formally withdrew from the Paris Agreement, President-elect Biden has pledged to rejoin on his first day in office.
- **Carbon pricing initiatives that are key to efficiently reducing atmospheric greenhouse gas continue to gain momentum.** 64 carbon pricing initiatives have been implemented or are scheduled for implementation in 46 national jurisdictions worldwide, mostly through cap-and-trade systems (as opposed to carbon taxes)—up by ~10% yoy. Together, these initiatives cover nearly a quarter of the world's total greenhouse gas emissions. Carbon prices have also increased in many jurisdictions, with prices nearly tripling in Switzerland and almost doubling in Portugal, but remain well below levels consistent with the Paris Agreement.
- **The de-carbonization cost curve has flattened, improving the affordability of reaching net zero carbon emissions.** We estimate that the annual cost of 50% de-carbonization has been reduced by ~20% yoy to $1tn pa in 2020, with two-thirds of this cost deflation driven by improved manufacturing efficiency through global scale and one-third by lower cost of capital. The higher part of the cost curve (towards 70% de-carbonization) has seen the greatest improvement yoy, mainly due to renewed policy support for clean hydrogen, resulting in a roughly 30% global annual cost reduction to $2tn. And the proportion of greenhouse gas emissions that are non-abatable has declined to 15% as more technologies have reached commercial scale.
- **Investors continue to shift capital away from hydrocarbon investments.** As a result, we've seen a significant divergence in the cost of capital of oil & gas (with hurdle rates of 10-20%) and renewable projects (3-5% hurdle rates for the regulated investments in Europe). We estimate that this divergence implies a carbon price of $40-80/ton, well above most carbon pricing schemes, and has structurally constrained the oil & gas industry's ability to invest. This has taken a toll on oil resource life, which we estimate has fallen from 50 years in 2014 to 30 years in 2020 among Top Projects.
- **Meanwhile, interest in ESG/green investing continues to grow.** There are now 3000+ signatories to the Principles of Responsible Investment, representing over $103tn in AUM, an increase of 20% yoy. Signatories are required to incorporate ESG considerations into at least 50% of their AUM by year-end 2020, suggesting that at least $50tn should be "ESG aware" by the end of this year. ESG fund flows have remained consistently positive, with ESG equity fund inflows of $210bn vs. $461bn of outflows from non-ESG equity funds ytd. And investment vehicles like green bonds, carbon ETFs, etc. have continued to proliferate. Largely in response to investor interest in ESG/green investing, the number of companies in the Global S&P 1,200 mentioning Sustainability Accounting Standards (SASB) and Task Force on Climate-Related Financial Disclosures (TCFD) has risen to 268 and 515, respectively, as of June 2020—up by ~65% and ~25% yoy, respectively.

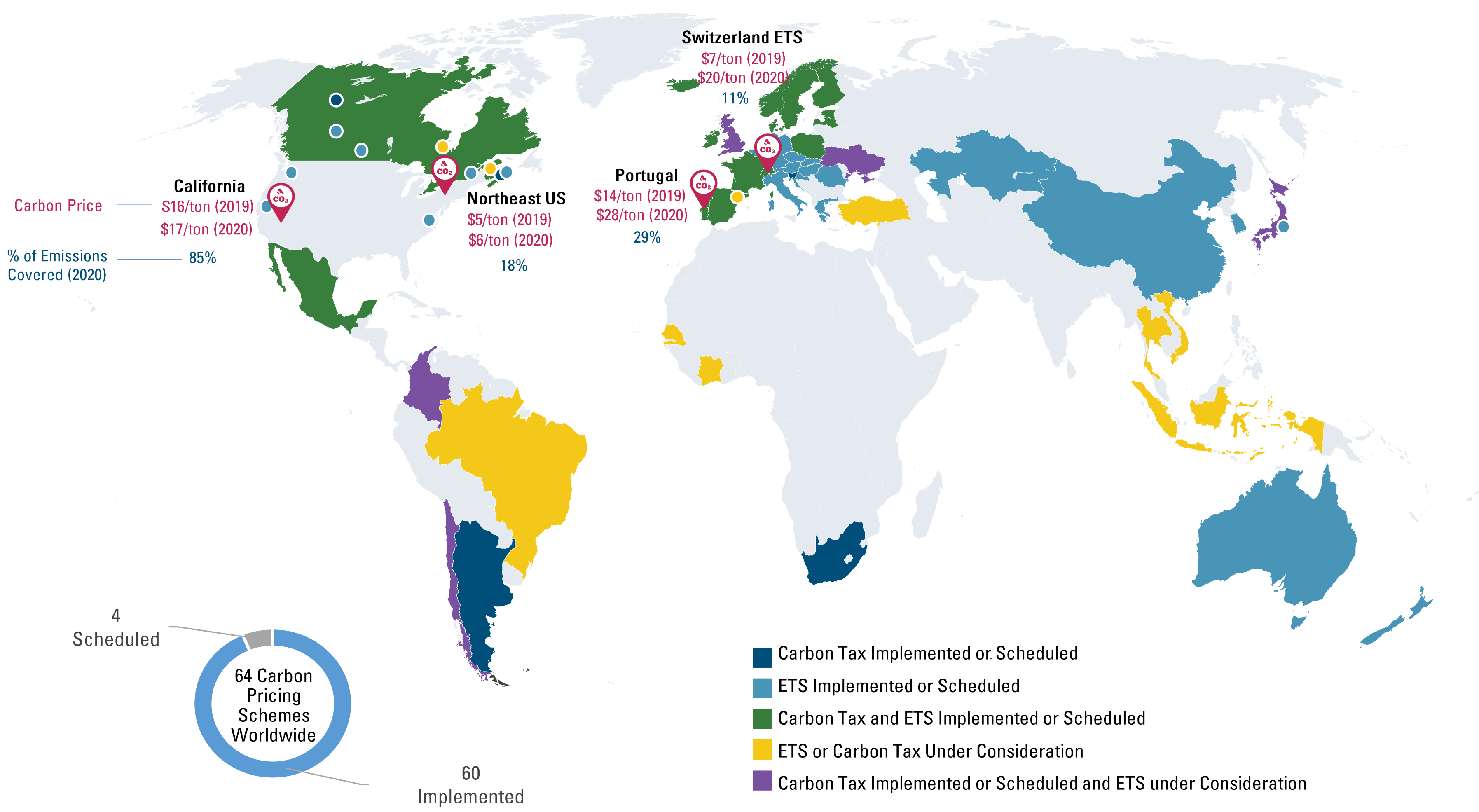
What to look for in 2020 (and beyond):

- **Continued focus on climate change by firms and governments.** We believe that China's net-zero pledge and President-elect Biden's victory will ignite a fresh focus on carbon pricing, renewables and sectors in transition. China is expected to launch the initial phase of its ETS roadmap sometime next year, Biden's plan for a "clean energy revolution" includes deep investments in clean energy of $2tn over four years (but a divided Congress would likely hinder much of this, see pg. 23.)
- **The 26th UN Climate Change conference**, taking place in November 2021 in Glasgow. The conference will be the first one that evaluates progress towards Paris Agreement goals, with some signatories expected to increase their national goals.
- **The implementation of EU Green Taxonomy disclosure requirements in December 2021.** These will apply to nearly all financial products sold into and created within Europe with the intention of reorienting capital flows towards sustainable outcomes. We believe this will have major implications for investor flows and the costs of capital for companies worldwide.
- **Significant further developments in ESG investing.** We expect interest in ESG investing will continue to grow. On the "G" side, this is especially likely as Biden takes office and the EU Green Taxonomy moves forward. We also expect investor scrutiny of corporate diversity & inclusion and executive pay to intensify as we approach 2021 AGM season.
- **Substantial investment in renewable power.** We estimate renewable power will become the largest area of energy investment in 2021, surpassing upstream oil & gas for the first time in history. This will benefit commodity inputs like copper, nickel, and lithium, as well as rare-earth elements.
- **A continued transformation of Big Oils to Big Energy.** As Big Oils continue to reimagine their business models consistent with global ambitions to reduce carbon emissions, we believe companies are likely to divest from areas like oil sands and mature fields in favor of areas including LNG, biofuels, and renewables.

Thanks to: GS ESG Strategy Research, GS SUSTAIN Research, and GS European Energy and Utilities Equity Research.

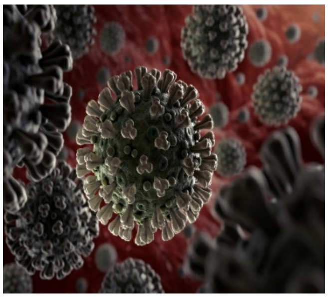
Update: More and higher carbon prices

Nearly a quarter of global greenhouse gas emissions are covered under carbon pricing initiatives



Note: Carbon prices may not be comparable among countries, due to differences in sectors covered, allowances distributed, and exemptions applied; map changes from the original map published on January 30, 2020 reflect new developments in addition to corrections following new information from official government sources; data as of August 1, 2020.
Source: World Bank., Goldman Sachs Global Investment Research.

2020's Black Swan: Coronavirus



"[I see] no reason to think that this [virus] is just going to end with the onset of warmth in the Northern Hemisphere. I'm afraid that this could very well play out like a pandemic influenza over the months ahead in both hemispheres at the same time."

– Dr. Michael Osterholm, Professor, University of Minnesota

Published: February 28,2020

Where we stand now:

- **The coronavirus has infected over a reported 74mn people and led to more than 1.6mn deaths globally.** Although the total number of infections is likely understated given the significance of asymptomatic carriers and limited testing, especially at the start of the pandemic, the number of fatalities likely provides a more accurate reflection of the virus' human toll. The total number of virus-related deaths has risen to more than 307K (933 per million pop.) in the US, giving it one of the highest per capita fatality rates in the world. In Western Europe, total fatalities have now surpassed 350K (761 per mn). And in EM, the severity of the outbreak has varied across regions, with more than 477K fatalities in LatAm (746 per mn), 236K in CEEMEA (367 per mn), and 256K in EM Asia (65 per mn).

- **After the initial outbreak in Wuhan, China, COVID-19 spread rapidly around the world throughout the spring and the summer, and a new wave has hit many regions in recent months.** Europe and the US have struggled with a second wave post the summer that has seen far higher levels of new cases than earlier in the year. In Western Europe, daily new cases surged to over 200K in November, after registering a previous high of around 35K in April. Cases across Europe flattened after the reimposition of some government control measures, but are now growing again in Germany, the UK, and France. In the US, daily new case growth has recently surged to over 200K, compared to a peak of around 70K in July, and daily new fatalities recently spiked to more than 3K. Cases are also increasing in CEEMEA, LatAm, EM Asia (ex. India), and DM Asia.

- **The US's ability to cope with the virus has improved, but is still showing some strain.** A ramp-up in testing has enabled greater tracking and adaptation; the US is now conducting roughly 1.9mn tests per day, compared to about 900K during the height of its first wave that peaked in the summer. Improved hospital treatments have also likely contributed to faster recoveries and lower fatality rates for the worst cases. But US hospital capacity is becoming increasingly stretched by the latest surge, and 19 states and Washington, D.C. now report ICU capacity as "constrained" or "severely constrained."

- **We've learned much more about virus transmission,** including that it's most likely in close proximity and through respiratory droplets or small particles generated when an infected individual coughs or sneezes. Evidence suggests most infections originate from a small number of super spreaders, and virus spread typically occurs early on in the illness. Social distancing significantly lowers infections, with the risk of transmission estimated to be 7x smaller when physical distance exceeds one meter. And we've found that wearing face masks substantially reduces infection risk. We've also learned that the risk of fatality increases exponentially with age. But we've found that the case fatality rate has likely declined over the course of the pandemic.

- **The pandemic pushed the global economy into what's likely the deepest but shortest recession since WWII,** prompting a massive fiscal and monetary response from policymakers worldwide (see pages 10-11).

- **Risky assets experienced a sudden collapse with the onset of the pandemic, but most rebounded sharply.** The S&P 500 fell by 20% in just 16 trading days (Feb 19 – Mar 12), marking the fastest bear market in history. But the index recovered to its pre-pandemic peak in five months and is now up 15% ytd. US IG and HY credit spreads widened to peaks of 373bp and 1100bp (on March 23), respectively, before retracing substantially after the Fed's forceful intervention, and sit at 102bp and 379bp today. Global oil prices plummeted to historic lows, with the nearby WTI futures contract closing in negative territory for the first time ever (on April 20), but after a violent rebalancing have since partially recovered into the $45-55bbl range (see pages 12-13).

What to look for in 2021 (and beyond):

- **Further worsening of the virus trajectory as Northern Hemisphere weather turns colder.** We expect a further rise in case growth as the weather turns increasingly colder in the US and Europe. We find that temperature is associated with disproportionately large increases in virus spread when dropping below 7°C (45°F).

- **A V(accine)-shaped recovery.** Despite recent virus resurgence, we believe widespread vaccination and continued policy support will drive a strong recovery next year, and expect above-consensus global growth of 6.3% in 2021 (see pages 10-11).

- **More upside for cyclical assets.** We think the vaccine-led recovery in global growth will support risk assets in general, and see the most runway for the recovery to be reflected in commodities, commodity-related assets in FX and equities, US breakeven inflation, EM assets, and USD weakness (see page 20).

Thanks to: GS Global and US Economics Research, GS Equity and Credit Strategy Research, and GS Commodities Research.

Update: A once-in-a-century pandemic

Unlike the current COVID-19 outbreak, there is little evidence that asymptomatic transmission occurred in past epidemics. No such evidence exists for the SARS or MERS outbreaks.

1 1918-1919
Spanish influenza
Total infections: 350 – 750 million
Mortality: 20-50 million people
Case-fatality rate: 2-3%
R0: 1.5-1.8
Transmission: Through nearby contact with infected respiratory droplets

2 1957-1958
Asian flu (H2N2)
Mortality: 1-4 million
Case-fatality rate: <0.2%
R0: 1.5
Transmission: Through nearby contact with infected respiratory droplets

3 1968-1969
Hong Kong flu (H3N2)
Mortality: 1-4 million
Case-fatality rate: <0.2%
R0: 1.6-1.8
Transmission: Through nearby contact with infected respiratory droplets

4 2002-2003
Severe acute respiratory syndrome (SARS)
Total infections: 8,000
Mortality: 770 people
Case-fatality rate: 10%
R0: 3
Transmission: Close person-to-person contact

5 2003-2009
Avian flu (H5N1)
Total infections: 470
Mortality: 280 people
Case-fatality rate: 60%
R0: 0.1-1.1
Transmission: Contact with infected birds; person-to-person spread rare

6 2009-2010
Swine flu (H1N1)
Total infections: 750 million – 1.4 billion
Mortality: 150k-575k people
Case-fatality rate: 0.01-0.08%
R0: 1.3-1.7
Transmission: Contact with infected pigs; limited person-to-person spread

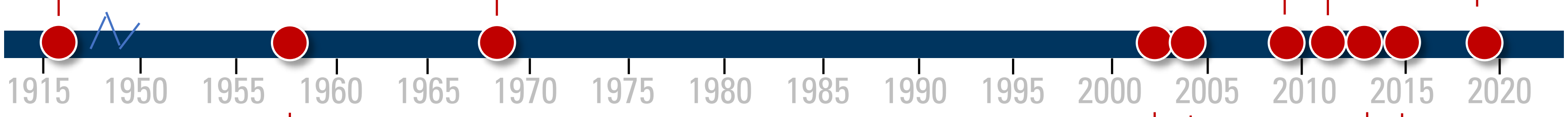
7 2012-2020
Middle East respiratory syndrome (MERS)
Total infections: 2500
Mortality: 860 people
Case-fatality rate: 34%
R0: <1
Transmission: Close person-to-person contact

8 2013-2017
Bird flu (H7N9)
Total infections: 1600
Mortality: 600 people
Case-fatality rate: 39%
R0: 0.03-0.4
Transmission: Contact with infected poultry; person-to-person spread rare

9 2014-2016
Ebola
Total infections: 30,000
Mortality: 11,000 people
Case-fatality rate: 50%
R0: 1.5-2.5
Transmission: Bodily fluids

Update:

10 2019-
Coronavirus (COVID-19)
Total confirmed infections: 74 million
Mortality: 1.6 million
Case-fatality rate: Unknown*
R0: 2.0 – 3.0 (1.9 – 6.5)**
Transmission: Close contact; respiratory droplets



*Note: *During a pandemic the CFR is a poor measure of the mortality risk of the disease; **RO refers to the base reproduction rate or the number of expected cases of a disease directly generated by one infected individual in the absence of immunity from previous infection/vaccination and control measures to stem transmission; RO is difficult to measure during the course of an outbreak; a survey of 21 estimates of the RO of COVID-19 showed a range of 1.9-6.5 with 13 in the range 2.0-3.0.*
Source: CDC, WHO, NCBI, NIH, NLM, JCM, Johns Hopkins, Goldman Sachs Global Investment Research.

Roaring Into Recession

"There is little doubt that we are headed for a contraction that will see at least some businesses shut and unemployment rise substantially, at least temporarily; in the US, I think a 10% unemployment rate, or even higher is perfectly plausible."

– Jason Furman, Professor, Harvard Kennedy School of Government

Published: March 24, 2020

Where we stand now:

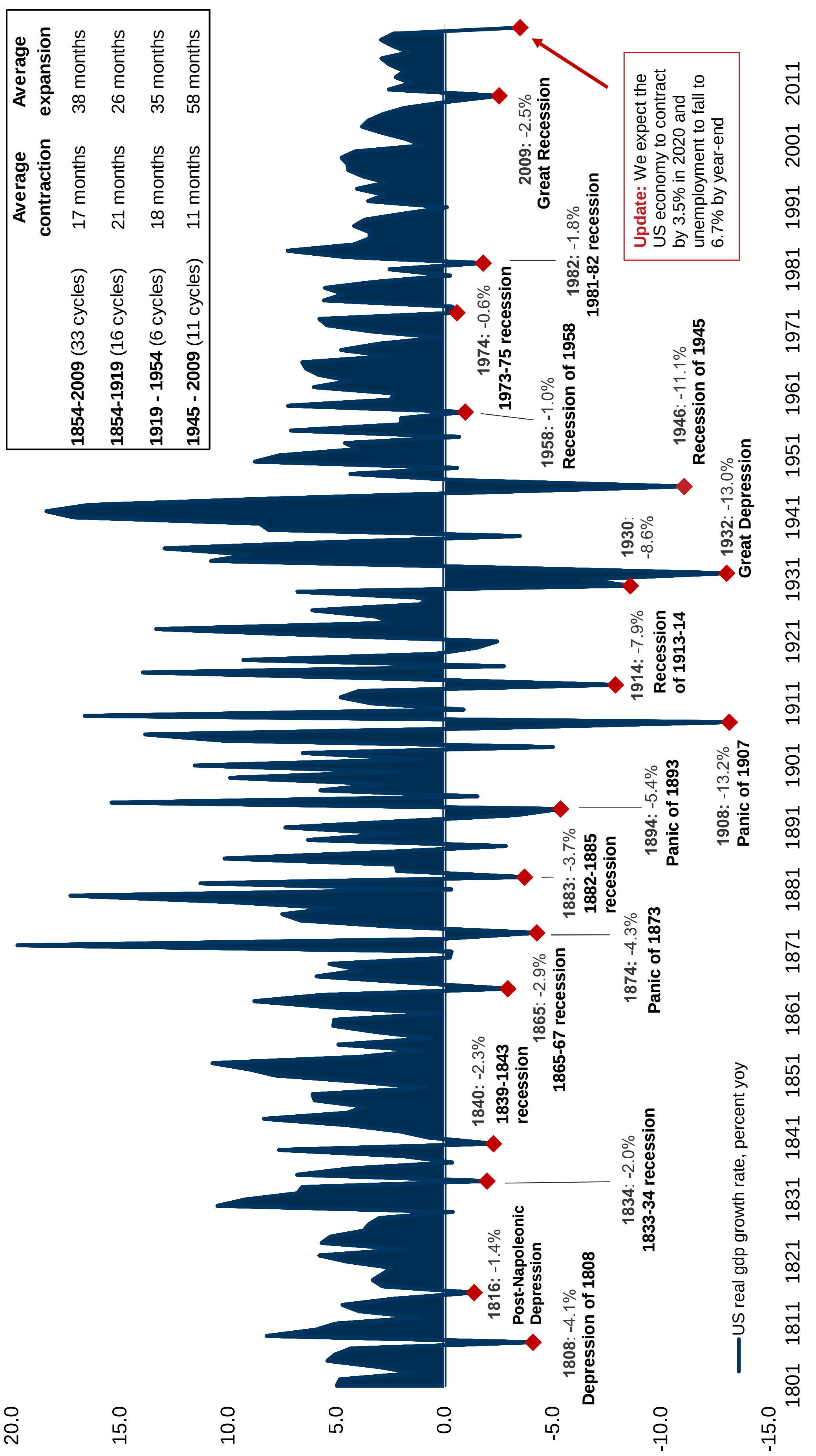
- **The global economy experienced what's likely the deepest and shortest recession since at least WWII.** We expect the global economy will contract by 3.7% in 2020, more than 4x as much as during the Global Financial Crisis (GFC). At the epicenter of the outbreak, China experienced the earliest growth decline and the swiftest recovery. In Q1, China GDP declined by 35% qoq ann., the country's first quarter of negative growth in decades. For the US and Europe, the brunt of the impact came in Q2 after the imposition of widespread lockdown measures to contain virus spread. The US experienced a collapse in economic activity in Q2 (-31.4% qoq ann.) more than 3X that of the largest previous decline in modern US GDP statistics (1Q1958: -10%). And in Europe, Q2 GDP fell by 39.5% qoq ann., representing the largest area-wide decline since data became available in 1995. But growth then rebounded sharply in China in Q2 and the US and Europe in Q3 as lockdown measures eased (see pages 14-15.) We estimate the hit to global growth from lockdowns peaked at 20% in mid-April and has since fallen to 7.75%.
- **Policymakers in advanced economies initiated likely the largest fiscal easing of the postwar period.** Globally, we estimate that policymakers have enacted fiscal easing of around 7-8% of global GDP in response to the coronacrisis. In the US, Congress passed the CARES Act in late March, and we expect around $2.6tn (12.6% of GDP) in total discretionary easing in 2020. In the EU, EMU-4 national governments have enacted discretionary easing of around 4% of GDP to date, and EU leaders agreed to a historic EUR 750bn Recovery Fund in July. And in EM, fiscal easing has averaged more than 4% of GDP.
- **Monetary policy also eased sharply, and provided liquidity backstops.** The Federal Reserve cut the funds rate by 150bp to the zero lower bound and initiated an open-ended asset purchase program that has grown its balance sheet by around $3tn to roughly $7.2tn. The Fed also introduced a number of new facilities to backstop credit markets by providing companies with direct access to credit and supporting liquidity in the corporate bond market. The ECB introduced a EUR $1.85tn Pandemic Asset Purchase Programme (PEPP) and increased its Asset Purchase Programme (APP) by EUR 120bn, which have contributed to a roughly EUR 2tn expansion of its balance sheet to about EUR 6.9tn. In EM, central banks delivered average easing of 250bp in LatAm, 200bp in CEEMEA, and 100bp in Asia-ex China and Japan, and around 20 deployed asset purchases for the first time.
- **The forceful policy response has limited labor market and business sector scarring.** Although the virus-driven sudden stop led to a historic surge in unemployment—with headline US unemployment rising by more than 10pp from 4.4% to 14.7% between March and April—it has since declined to 6.7%. In Europe and Japan, governments have successfully used generous wage subsidies and job retention programs to keep the rise in the headline unemployment rate limited. And even in countries where unemployment has risen more sharply, like the US, the increase has primarily come in the form of temporary layoffs. Despite concerns about a coming wave of bankruptcies (see page 16), the Fed's lending facilities and other central bank actions largely succeeded in limiting a wave of avoidable insolvencies—with bankruptcies down on the year in the US and other major economies—and the business sector has generally fared better than expected.

What to look for in 2021 (and beyond):

- **Above-consensus growth across much of the world.** After a period of weakness in the near-term as the world continues to struggle with virus spread, we expect above-consensus global growth of 6.3% in 2021, driven by a vaccine-led recovery in economic activity and continued strong policy support. Specifically, we expect above-consensus growth of 5.3% in the US and 5.5% in the Euro area in 2021 as widespread immunization leads to a strong reacceleration in activity. And we expect above-consensus growth in most of the Emerging Markets next year, most notably India and Russia.
- **China to march to its own drummer.** In China, we forecast 2021 growth of 8.0%—making it the only major economy where we don't expect above-consensus growth—given our expectation for policy normalization and a focus on high-quality growth.
- **Fading fiscal stimulus.** We expect passage of another COVID relief package in the US possibly in the next few days, but the US fiscal policy outlook more broadly depends critically on Senate control, which will be determined by the upcoming Senate runoff elections in Georgia on January 5 (see pages 22-23). In Europe, we expect a sustained fiscal impulse, with EMU-4 deficits of 6% in 2021. And in Asia, we expect fading fiscal stimulus over the course of the year.
- **Dovish DM central banks for several years**. We expect the Fed, ECB, and BoE to wait until 2025 before hiking rates, with the Fed likely maintaining asset purchases for much of the recovery period, and probably only aiming to taper purchases 1-1½ years ahead of liftoff. We think the ECB will fully execute the PEPP envelope by mid-2022, and expect net ECB QE purchases to run until mid-2023 with a handover to the APP in 3Q22.

Thanks to: GS Global, US, European and Asian Economics Research.

Update: A deep but short contraction



	Average contraction	Average expansion
1854-2009 (33 cycles)	17 months	38 months
1854-1919 (16 cycles)	21 months	26 months
1919 - 1954 (6 cycles)	18 months	35 months
1945 - 2009 (11 cycles)	11 months	58 months

Note: Red markers denote trough in yoy US growth in major recessions; US growth data for 1800-1979 from IMF "Fiscal Prudence and Profligacy" database; data thereafter from IMF WEO database; US business cycle data from NBER Business Cycle Dating Committee.
Source: IMF, NBER, Goldman Sachs Global Investment Research.

Oil's Seismic Shock

"Some people talk about the [oil] price war lasting 1-2 years… I don't think so…With the political pressures building, we could have a scenario in which this gets resolved soon."

– Daniel Yergin, Vice Chairman, IHS Markit

Published: March 31, 2020

Where we stand now:

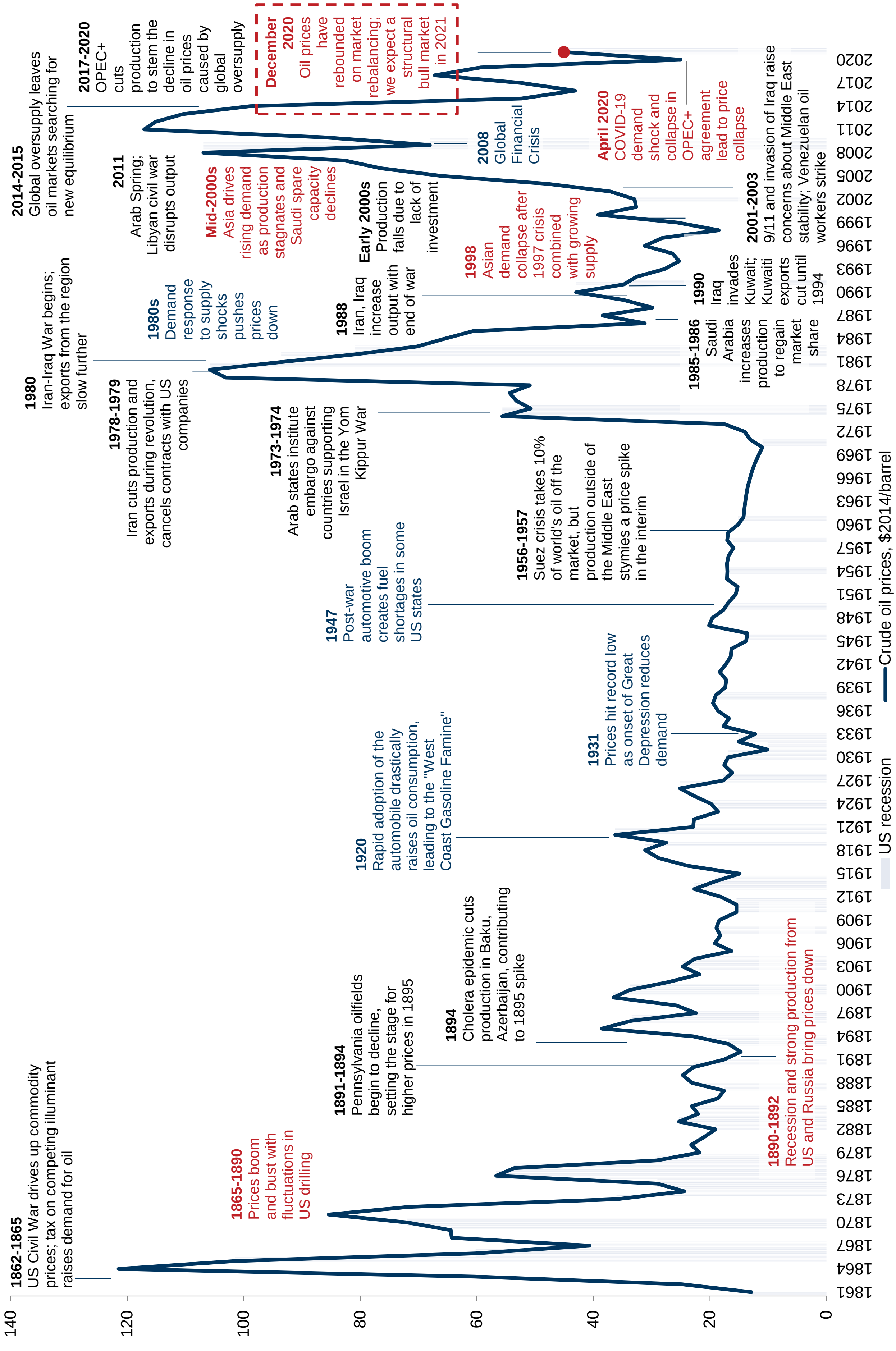
- **The standoff between OPEC and Russia resolved as OPEC+ members agreed to cut production… and, more recently, agreed to gradually increase it again.** In early April, OPEC+ members agreed to cut production by a record-large 9.7 mb/d, and in June, extended these cuts through July. But in recent weeks, OPEC+ agreed to raise production, with production levels set to increase in January by 0.5 mb/d, followed by monthly meetings to decide on the pace of future hikes.
- **Other supply developments surprised to the upside.** Libyan production staged a remarkable comeback of 1 mb/d following September's announcement by Libya's National Oil Corporation that it would resume exports from areas free of mercenaries. And in the US, while hurricanes significantly disrupted offshore production, recent guidance by US shale producers implies that onshore production will stabilize at slightly higher-than-expected levels from 4Q20 onwards. On net, we estimate a rise in global oil supply to 93.1 mb/d this month, 8% below year-end 2019 levels.
- **Oil demand partially recovered from the enormous pandemic hit.** Oil demand fell by 21 mb/d—or 20%—at its peak in April vs. 2020 pre-COVID expectations as the pandemic led to a collapse in transportation-related demand. Demand has since rebounded, remaining only 7% below pre-pandemic expectations in October. But the most recent wave of COVID-19 infections and renewed lockdowns in several countries are expected to reduce global oil demand by 1.5 mb/d this month to 92.7 mb/d, 8.6% below year-end 2019 levels.
- **The oil market swung back from deficit to surplus.** After moving into a deficit in late May, the 2.2 mb/d October deficit was derailed by the higher Libyan supply and recent pandemic demand hit; we now expect a 0.3 mb/d December surplus.
- **Oil prices recovered, but remain volatile.** On April 20, the May WTI contract closed at -37.6/bbl, the first negative settle ever, as the oil glut overwhelmed physical oil storage and pipeline capacity. Since then, prices have strongly rebounded as the market has begun to rebalance. But prices have generally been volatile in recent months as oil markets remain caught between negative lockdown news and the prospect of a vaccine-led rebound, with a selloff in early November on the reimposition of lockdowns quickly followed by a sharp rally on vaccine news.
- **Consolidation in the oil & gas industry continued.** Consolidation had already reached the high levels of 2003 as of 2019 in global Deepwater, peaked in Norway, and started in the Canadian Oils Sands. And such efforts recently began in US shale, reflecting a need for scale to operate at a lower cost of capital and a shift to a sustainable free cash-flow oriented business model. Following a wave of consolidation in the Permian basin, the six largest producers now account for half of Permian production, up from nearly 35% in early 2020, reflecting the highest level of concentration since 2002.
- **The outlook for energy credits turned more positive.** In May, we upgraded the USD HY Energy sector to neutral from underweight following stabilization in WTI crude oil prices and a large influx of fallen angel Energy issuers into the HY universe, which increased the sector's size and motivated HY investors to reconsider their underweight allocations. We upgraded the sector again to overweight in September on the back of a more constructive stance towards cyclicals and increased prospects for a rebalancing in the oil market. Default rates in the sector also declined over the course of the year, from a peak of 14.7% in July to 5.1% in October (based on 3m trailing HY Oil and Gas issuer-weighted default rates, non ann.)

What to look for in 2020 (and beyond):

- **A structural bull market in oil.** We expect oil demand will rise by 6.7 mb/d—or 7%--in 2021 as the COVID-19 vaccine rollout boosts the global economy and leads to a greater recovery in transportation demand. We also see several headwinds to oil supply, including a structural decline in non-OPEC growth driven by both a thinner pipeline of mega-project deliveries and a slowing pace of US shale growth as consolidation continues, and as the Biden administration and some states potentially impose stricter environmental regulations around shale oil. Although Biden's victory also increases the likelihood of the US rejoining the Iran nuclear agreement—and higher Iranian oil supplies—we don't expect increased supplies from Iran until 2H22 at the earliest. On net, we expect Brent crude oil prices to resume their rally in 1Q21, and to reach $65/bbl by late 2021.
- **Higher OPEC+ market share.** We believe that the expected decline in non-OPEC supply growth, combined with the recent OPEC+ agreement that allows them to exit their current cuts in a coordinated gradual manner, will allow OPEC+ to target higher production and market share without derailing the oil market rebalancing and subsequent price rise.
- **Further consolidation for US shale.** Lower oil prices, higher costs of capital, and the increasing focus of investors on ESG metrics lead us to expect the consolidation Herfindahl index for shale to peak in 2021.
- **Strength for HY energy credits.** Given still-attractive valuations and the supportive backdrop for commodities, we continue to recommend an overweight allocation to HY Energy in 2021, and see favorable conditions for energy sub-sectors, including oil E&Ps, land drillers, and certain midstream and refiner credits.

Thanks to: GS Commodities Research, GS Energy Equity Research and GS Credit Strategy Research.

Update: Oil prices collapsed, then rose



Source for data: BP, NBER/Federal Reserve Bank of St. Louis, Haver Analytics.
Source for annotations: ©James Hamilton, "Historical Oil Shocks," University of California, San Diego, February 2011; various news sources; Goldman Sachs Global Investment Research.

Reopening the Economy

"The issue is [reopening] may in fact be a demand-side problem and that demand-side problem is not something you're going to mitigate just by opening up a restaurant or salon…. It's something you're going to get back when you have an effective testing regime."

– Dr. Zeke Emanuel, Vice Provost, University of Pennsylvania

Published: April 28, 2020

Where we stand now:

- **Much of the US reopened…** US lockdowns have substantially declined since the spring based on our GS Effective Lockdown Index (ELI), a measure of the level of official restrictions and changes in mobility, though still remain above pre-pandemic levels. We estimate that lockdowns led to a peak implied hit of 20% to US GDP in April, compared to a drag of around 6% today. Our single stock analysts' US Reopening Scale shows activity in "back-to-normal" categories, which includes the most heavily impacted consumer segments, has increased by 32pp since the trough but is still 39% below February levels. We find US consumer spending has recovered from 83% of the pre-pandemic level at the trough in April to about 95% today.
- **…but reopening has flatlined or even started to reverse in many US states.** Our US ELI has tightened in recent weeks after some states moved to reimpose control measures in response to virus resurgence. Business restrictions of some degree are now in place in 23 US states, Washington D.C. and Puerto Rico, and stay-at-home orders or curfews have been issued in parts of California, North Carolina, Ohio, and Puerto Rico.
- **Schools reopened in much of the US, but some states have now reversed course.** Roughly half of US school districts planned to start the school year with full in-person instruction, compared to around one-quarter that opted to remain fully remote and 12 percent that adopted a hybrid model. But recent virus resurgence has forced 11 states, Washington D.C., and Puerto Rico to implement full or partial closures of K-12 schools and to move to fully remote learning. Among a sample of 1,442 4-year colleges in the US, as of early September roughly one-third were fully or primarily in-person this fall, one-fourth used a mix of in-person and online teaching, and about 40% were fully or primarily online.
- **Europe has reimposed some lockdown measures.** After a steady loosening through the summer and early fall, lockdown measures increased in Europe in recent months in response to a surge in new virus cases. Partial nationwide lockdowns were adopted in France, Germany and the UK, and more moderate regional lockdowns in Italy and Spain in October and November. France recently announced a partial easing of some of these measures, but Germany has moved to impose a more stringent nationwide lockdown in the face of rising case growth and more onerous restrictions are being implemented in London.
- **Progress is still being made on testing capacity, which remains critical for detecting infections, reducing transmission, and facilitating reopening.** Our healthcare analysts estimate current US testing demand of 50-100mn per month based on K-12 schools, colleges and universities, and workplace settings. The US has ramped-up lab-based PCR testing, which remains the gold standard for accuracy and diagnosing infected individuals, with volumes of PCR tests plateauing at roughly 45mn PCR tests per month—around current testing capacity. But PCR testing still faces the obstacle of long turnaround times for results in parts of the country. The use of antigen testing, which is cheaper and provides more rapid results, to facilitate the broad population screening required for reopening has also increased. We estimate the US has the capacity to conduct about 82mn antigen tests a month, and expect this will grow further as they play an increasing role in the overall national testing strategy.

What to look for in 2021 (and beyond):

- **Likely limited further lockdowns in the US, and a limited drag on growth**. While state and local governments have reimposed targeted restrictions, we think the bar for new broad lockdowns in the US is significantly higher than in March and April. Economic activity has also shown to be less sensitive to virus impacts than during the first wave as people and governments have learned to restrict only the activities that pose the highest risk of infection relative to their economic value. Indeed, consumer spending is already nearing pre-pandemic levels, and we believe that construction activity will similarly experience only a modest decline in the winter months. But the possibility of further lockdowns on substantially worsening virus spread in the face of colder weather poses downside risks to US economic activity in the near term.
- **Likely avoidance of a double-dip recession in Europe after emerging from a second wave of lockdowns.** We expect modestly positive Euro area growth of 0.9% qoq non ann. in 1Q21 as virus containment measures begin to ease. And we see a more front-loaded recovery in 2Q21, reflecting a further reduction in lockdown measures and widespread vaccination, and forecast strong growth of 3% qoq non. ann in 2Q21 (see pages 10-11). We believe that Germany will weather the coronacrisis better than its European peers, given significant domestic policy support and its lower exposure to lockdown-sensitive sectors, and that Italy looks better positioned than Spain for a recovery in 2021.

Thanks to: GS Global, US and European Economics Research, and US Medical Technology Equity Research.

Update: Reopening—a bumpy road

	Virus outlook			Economic reopening plans			
Countries	Total Confirmed cases (as % of pop)	Daily Change in confirmed cases (7dma)	Daily Change in fatalities (7dma)	GS Effective Lockdown Index* (0-100)	Non-essential businesses	Schools	Notes
China	87K (0.01%)	15	0	11	• Non-essential businesses open in low-risk regions, restrictions in place for medium-risk regions and lockdowns in high-risk regions. • One high-risk area currently (Manzhouli City, Inner Mongolia) and seven medium-risk regions (six in Inner Mongolia and one in Chengdu) as of 9 Dec. 2020. • No restrictions in place in low-risk regions, but contact tracing app remains in use. Avoiding gatherings recommended in medium-risk regions and stay-at-home orders in place in high-risk regions.	• All schools in China reopened on September 1 (some as early as in April) except for several in high-risk regions (i.e. Xinjiang Uygur Autonomous Region).	• Government implemented a 3-tier risk profile (low/medium/high risk) on a neighborhood/township level. Grading is based on how many confirmed cases there have been in the past 14 days. • Mass testing in places where there are suspected clusters (e.g. Tianjin, Shanghai, Qingdao, Xinjiang).
Japan	187K (0.14%)	2,617	35	17	• With a third virus wave expanding from mid-November, some large cities requested restaurants / bars operate short hours (close at 10pm). • No legally binding lockdowns. The state of emergency was lifted on May 25.	• Currently all schools have reopened, except for universities which are still mostly online.	• The government has mostly relied on citizen's adoption of voluntary social distancing and caution to limit virus resurgence.
USA	16.9mn (5.1%)	215,729	2,570	25	• Businesses closures of some degree remain in place in 23 US states, Washington D.C. and Puerto Rico. • Partial stay-at-home orders or curfews have been issued in California, North Carolina, Ohio, and Puerto Rico	• 11 states, Washington D.C., and Puerto Rico have ordered full or partial closures of K-12 schools.	• California stay-at-home order implemented on Dec. 3 requires partial lockdowns in regions with less than 15% ICU capacity.
France	2.4mn (3.8%)	12,201	389	50	• After a new partial national lockdown began on Oct. 30, shops have been allowed to reopen and travel restrictions eased to 20km within the home since Nov. 28. • Restaurants and pubs could be allowed to reopen starting Jan. 20.	• Schools have been open since Sep. 1 despite recent virus resurgence.	• As of Dec. 15, restrictions on non-essential travel, social gatherings, and travel across regions and internationally have been eased. • A national curfew is in place from 8pm to 6am, and everyone must remain at home during these hours.
Germany	1.4mn (1.7%)	24,201	545	32	• A new nationwide lockdown went into place starting Dec. 16. • Most non-essential businesses closed until Jan. 10 and employers encouraged to provide extended vacation.	• Schools have been closed until January 10.	• Private gatherings of more than 5 people are banned, though restrictions will be relaxed for Christmas holiday.
Italy	1.8mn (3%)	16,856	685	49	• Government implemented tiered lockdown measures in early November with "red", "orange" and "yellow" zones. • In red zones, all bars, restaurants and most shops must close; in orange, restaurants and bars have closed, but hairdressers and beauty salons remain open; in yellow, no further measures are in place beyond the nationwide curbs (see notes) • There are currently 0 red zones, 9 orange zones, and 12 yellow zones	• Schools have been open since mid-Sept., though some older students have had to return to remote learning.	• Nationwide curfew in place from 10pm until 5am irrespective of regional lockdown measures. • During these hours, people can only leave their homes for work, medical reasons, and emergencies.
Spain	1.7mn (4%)	8,741	225	44	• Nationwide curfew announced on Oct. 15, granting regional authorities ability to adopt stricter measures. • Bars and restaurants are open in most regions, but increased restrictions on hours and capacity are expected to be implemented ahead of Christmas.	• Schools reopened in Spain in early Sep., but some high schools have moved to remote learning in response to virus resurgence.	• State of emergency extended by Parliament until early May 2021. • Public and private gatherings of different households limited to six people or fewer.

Daunting Debt Dynamics

"Rising debt is not desirable and is not a free lunch, even with very low interest rates; that view is just wrong… But that doesn't mean we shouldn't be buying lunch for everyone right now. We should be doing so."

– Kenneth Rogoff, Professor, Harvard University

Published: May 28, 2020

Where we stand now:

- **Global public debt levels are set to rise to around 100% of global GDP this year, the highest level on record.** Globally, substantial fiscal easing in response to the coronacrisis has led to a sharp rise in fiscal deficits this year, with deficits expected to rise by around 11pp to 14% in DMs and 6pp to 10% in EMs this year. This compares to increases of roughly 5pp in both DM and EM deficits, respectively, between 2008 and 2009 during the GFC. We expect debt-to-GDP ratios of 97% in the US, 71% in Germany, 120% in Spain and France, and 160% in Italy this year. And in EM, we think debt-to GDP ratios will rise to 74% in LatAm and 46% in CEMEEA.
- **Despite sizable issuance, DM yields remain far below pre-pandemic levels.** To keep pace with rising fiscal demands, net issuance of US Treasuries rose by about \$3.1tn to \$4.2tn this year. In Europe, gross issuance of government debt increased by roughly EUR 900bn to EUR 2.7tn, but sizable central bank buying has limited the net supply available to the public, and economic and virus-related news have been far more important drivers of DM yields this year. DM yields remain far below pre-pandemic levels, with 10-year US Treasury and German Bund yields currently sitting at 0.94% and -0.57%, respectively.
- **EU leaders agreed to a EUR 750bn Recovery Fund**, which prevented a sharp rise in borrowing costs in southern Europe and limited the need for fiscal adjustment that could put the recovery at risk and delay a return to pre-crisis activity levels.
- **EM issuance and sovereign distress have continued to rise.** The coronavirus outbreak led to a sharp rise in EM USD sovereign issuance in 2020, especially among IG-rated issuers. Total EM sovereign USD issuance has risen to around \$170bn ytd (+38% yoy), with IG accounting for about \$113bn (+69%). In EM, five events of sovereign debt distress (defaults/distressed debt exchanges) have occurred this year, already more than the total during the GFC.
- **Corporates issued record-shattering USD debt,** as firms proactively raised cash and sought to reduce refinancing risk in response to the coronacrisis. Year-to-date gross issuance in the USD IG market stands at \$1.96tn (up 54% yoy), and year-to-date USD HY gross issuance totals \$416bn (up 61%). In the EUR market, the gross supply backdrop has been more in line with historical patterns, with year-to-date EUR IG issuance of EUR 657bn (up 1.5% yoy) and EUR HY supply of EUR 92bn (up 8%).
- **A comparatively rosy corporate default picture.** The pace of corporate defaults in the US and Europe has been more benign than during the GFC. We estimate that the 12-month trailing US HY default rate peaked at 8.8% in August (GFC high: ~10%) and has since fallen to 8.3%. In the Euro area, defaults have increased only modestly this year, and the 12-month trailing HY default rate stood at 4.3% at the end of October (GFC high: ~5%).

What to look for in 2021 (and beyond):

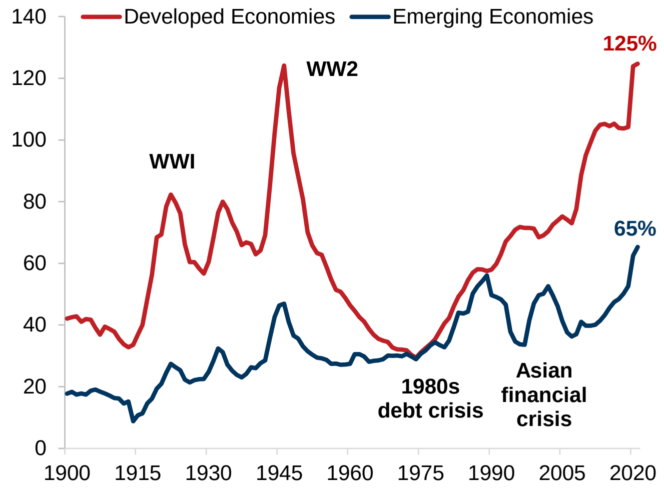
- **Rising debt, lower deficits and lower issuance across G10 markets.** We expect debt-to-GDP ratios to continue to rise, with the US likely to reach 103%, the Euro area 98% and Japan likely to surpass 250% of GDP next year, but that sovereign deficits are likely past their peak. With deficits on the decline, we expect lower new issuance numbers in absolute terms in G10 next year, especially as central bank purchases should continue to offset a portion of net supply across markets.
- **Modestly higher yields across G10 markets.** We expect US yields to move modestly lower in the coming months, reflecting increased public health challenges. But we think a vaccine-driven rebound in growth will push yields higher next year, and expect 10-year yields of 1.3% in the US, -0.4% in Germany, 0.1% in Japan, and 0.5% in the UK by year-end 2021.
- **Euro area sovereign risk on the back-burner.** We expect disbursements from the Recovery Fund to begin in 2Q21, which should help narrow Euro area funding gaps in coming years. We see limited sovereign risk in Italy and Spain next year.
- **Attractive risk-reward in EM HY credit despite lingering left-tail.** The sharp rise in public debt levels in EMs in response to the coronavirus crisis leaves a number of sovereigns, including Iraq, Sri Lanka, Angola, and Gabon, at risk of default. But we think the risk-reward still looks attractive in EM HY credit given low valuations and likely upside on the back of vaccine developments, and recommend going long the asset class heading into next year.
- **Continued pressure on EM local debt.** We expect the primary supply of local EM debt to remain above historical levels for several quarters, which is one reason we continue to recommend steepeners in select low-yielders.
- **Lower supply, decent returns, and lower defaults in corporate credit.** The pace of supply should normalize next year, with USD IG gross volumes of \$1.3tn (-33% yoy) and USD HY volumes of \$300bn (-28% yoy). We see some additional scope for credit spreads to tighten next year (hovering near pre-pandemic levels), delivering decent excess returns and solid Sharpe ratios in 2021. We expect the 12-month US HY trailing default rate will fall to its long-run average of 4% by year-end 2021.

Thanks to: GS Economics Research, GS Rates Strategy Research, GS EM Strategy Research, and GS Credit Strategy Research.

Update: A historic debt surge continued

Public debt set to reach the highest level on record...

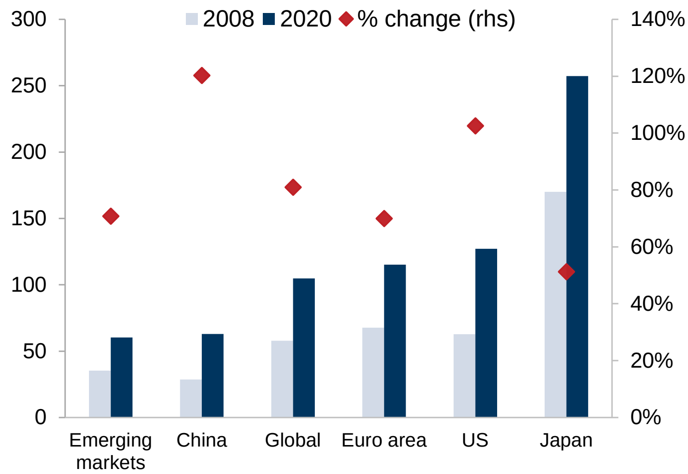
Median debt-to-GDP ratio in country grouping, % of GDP



Note: The aggregate public-debt-to-GDP series for advanced economies and emerging market economies is based on a constant sample of 25 and 27 countries, respectively, weighted by GDP in purchasing-power-parity terms.
Source: IMF, Goldman Sachs Global Investment Research.

…and had already risen since the Global Financial Crisis

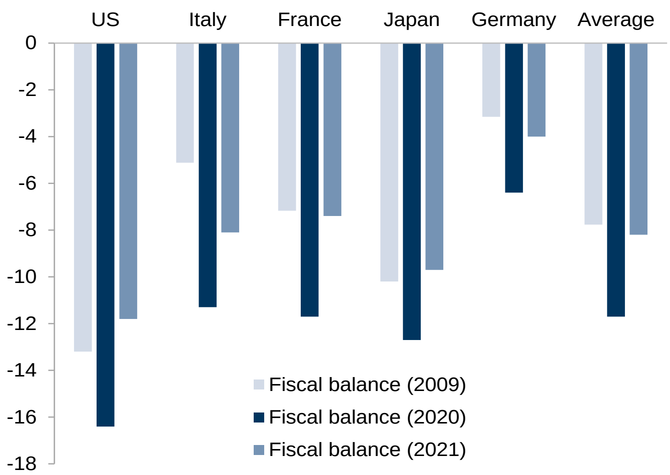
Gross debt as % of GDP (lhs); % change from 2008-19 (rhs)



Note: 2020 data as of Q2.
Source: IMF, Goldman Sachs Global Investment Research.

DM deficits will moderate somewhat in 2021…

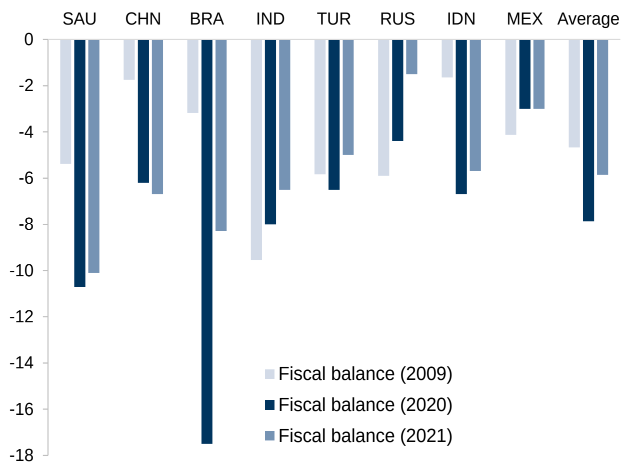
General government balance as % of GDP



Note: 2020 and 2021 figures represent GS forecasts.
Source: IMF, Goldman Sachs Global Investment Research.

…and deficits in EM are also set to come down

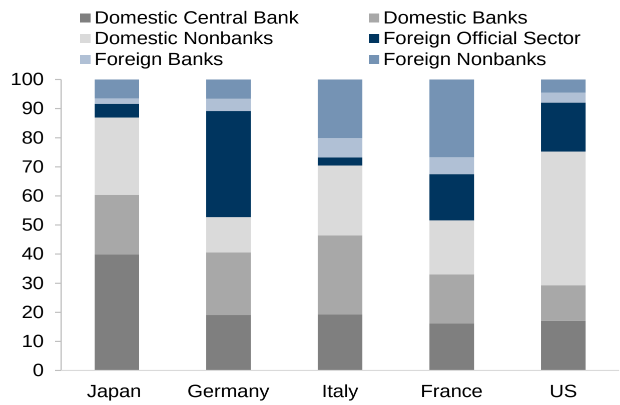
General government balance as % of GDP



Note: 2020 and 2021 figures represent GS forecasts.
Source: IMF, Goldman Sachs Global Investment Research.

Ownership of DM debt still varies across countries…

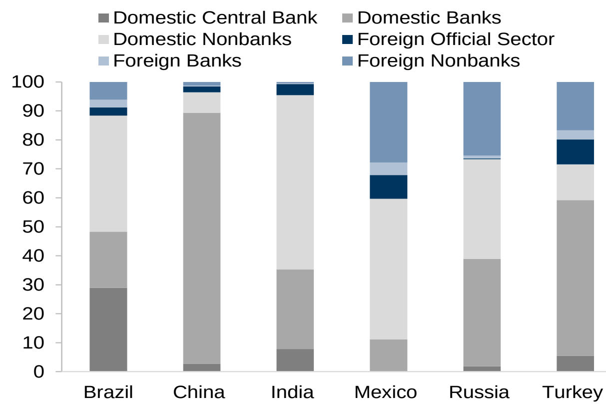
Ownership of government debt as of 2Q20, % total



Source: IMF, Goldman Sachs Global Investment Research.

…and even more so across EM

Ownership of government debt as 2Q20, % total



Source: IMF, Goldman Sachs Global Investment Research.

Investing in Racial Economic Equality

"In 1940, the median Black man's earnings would have placed him at the 24th percentile of the white earnings distribution. Today, that has barely risen to the 27th percentile, meaning that an average Black man today ranks in roughly the same place as his grandfather."

– Kerwin K. Charles, Dean and Professor, Yale School of Management

Published: July 16, 2020

Where we stand now:

- **Racial economic inequality remains a crucial issue for the economy and the country.** Black Americans continue to be heavily disadvantaged across a broad range of economic measures, including employment, earnings, household income, and wealth. Black Americans also continue to disproportionately suffer from the ongoing coronavirus pandemic, experiencing higher infection and mortality rates, as well as a greater impact on Black-owned businesses.
- **Corporate America has donated billions to social justice organizations, and many companies have launched initiatives to make their workplaces more inclusive.** For example, Adidas pledged to fill at least 30% of all open positions with Black or Latinx candidates. Estee Lauder pledged to make sure the percentage of Black employees at all levels would reflect the share of Black Americans within the next five years. Facebook pledged to double the number of Black and Latinx employees by 2023, and increase the number of Black employees in leadership positions by 30% over the next five years. PepsiCo pledged to increase the number of Black managers by 30% by 2025 and add at least 100 Black employees to its executive ranks. And Starbucks pledged to achieve BIPOC representation of at least 30% at all levels by 2025 and has connected diversity and inclusion goals to executive compensation. Companies are also recruiting more students from HBCUs.
- **Companies have also committed to increase diversity at the board level.** A number of public and private companies signed on to The Board Challenge—a pledge to add one Black director to their boards by September 2021—and several other companies that already have at least one Black board member, including Nordstrom, United Airlines, and Verizon, have signed on as well, pledging to use their resources to accelerate corporate diversity efforts. Macy's, Mastercard, and Uber, along with several other corporations, launched the Board Diversity Action Alliance, which includes commitments to increase the number of Black directors on company boards, disclose the race and ethnicity of board members, and report on diversity, equity, and inclusion measures on an annual basis. Nasdaq submitted a proposal to the SEC to require listed companies to have at least one minority or LGBTQ+ director. And Goldman Sachs pledged to only underwrite the IPOs of private companies that have at least 2 diverse board members in 2021. States are also getting involved—California Governor Gavin Newson signed legislation that would require public companies based in the state to have at least one diverse board director by 2021.
- **Efforts to direct capital towards minority-led firms have increased.** For example, SoftBank launched the Opportunity Growth Fund, a $100mn venture fund dedicated to investing in companies led by founders and entrepreneurs of color. And Goldman Sachs launched a Black and Latinx cohort within its $500mn Launch with GS investment strategy, which aims to increase access to capital and facilitate connections for women, Black, Latinx and other diverse entrepreneurs and investors.
- **The Fed has undertaken efforts to understand the implications of structural racism for America's economy and take action to improve economic outcomes for all groups.** The Federal Reserve Banks of Atlanta, Boston, and Minneapolis have partnered to create a series of virtual events where community, business, and academic leaders will examine the economic impact of racism and take concrete steps to achieve an inclusive and equitable economy. The first event took place in October, and more events are scheduled to take place over the next several months.
- **President-elect Biden has laid out his Plan for Black America to move towards economic equality for all.** The plan includes aiding and investing in Black businesses and entrepreneurs, expanding access to high-quality education by providing universal pre-K and making college affordable for Black students, ensuring universal access to affordable, high-quality healthcare, expanding and using the power of the DOJ to address systemic misconduct in police departments and prosecutors' offices, and ensuring that political appointees look like the country they serve, which he is trying to make good on through a diverse set of appointees.

What to look for in 2021 (and beyond):

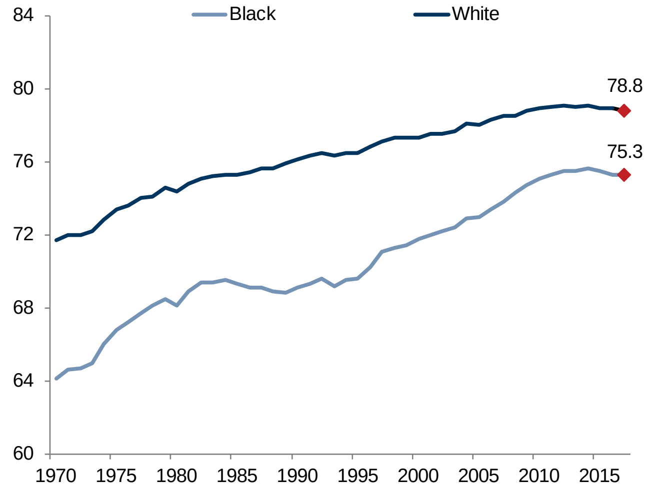
- **Addressing racial economic inequality will remain a key focus of policymakers, corporations and investors,** and we maintain that solutions will need to come from all areas of society—both public and private. In particular, we expect diversity and inclusion to be one of—if not the most—important issues for shareholders during the US 2021 proxy season, putting pressure on companies to institute good practices and disclose meaningful D&I targets.
- **Implementation of Biden's Plan for Black America.** President-elect Biden has said that tackling systemic racism will be one of the top goals of his administration, and we look for more specific timelines and details for the proposals he has outlined. Should Republicans retain their Senate majority, the legislative path for implementing these proposals may be more difficult, and the administration may have to rely on executive actions to put many aspects of the plan in place.

Thanks to: GS ESG Strategy Research and GS SUSTAIN Research.

Update: Racial disparities remain wide

Black Americans live shorter lives than white Americans...

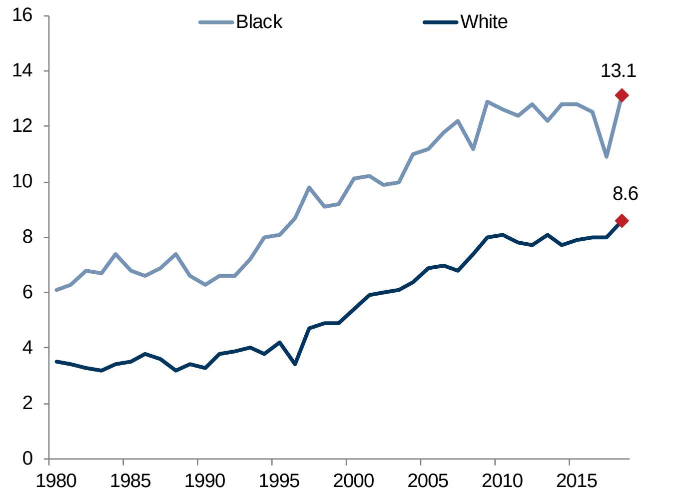
Life expectancy at birth, years



Source: National Center for Health Statistics, Haver, Goldman Sachs GIR.

…and suffer from higher rates of chronic illnesses

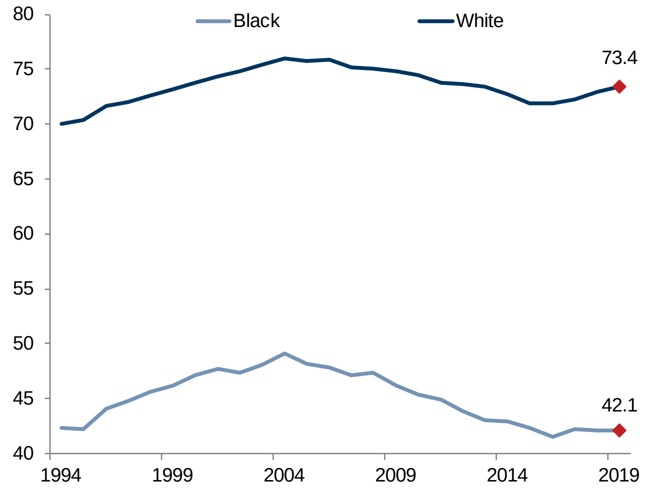
Age-adjusted prevalence of diagnosed diabetes for adults 18+, %



Source: CDC, Goldman Sachs Global Investment Research.

Black Americans are significantly less likely to own a home…

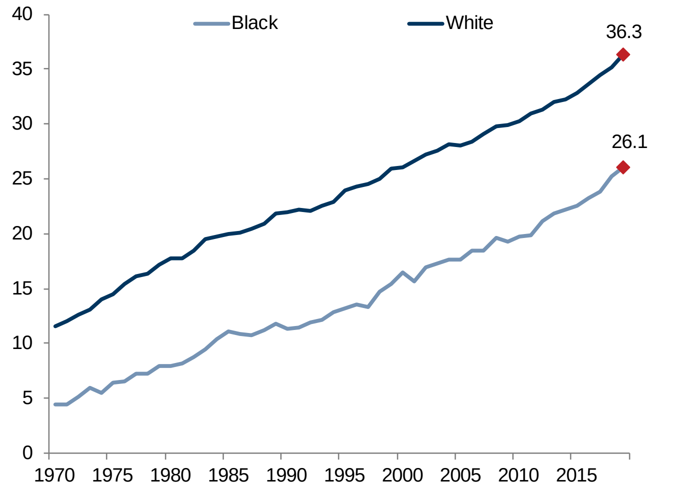
Rates of homeownership, %



Source: US Census Bureau, St. Louis Fed, Goldman Sachs GIR.

…and are less likely to finish college than white Americans

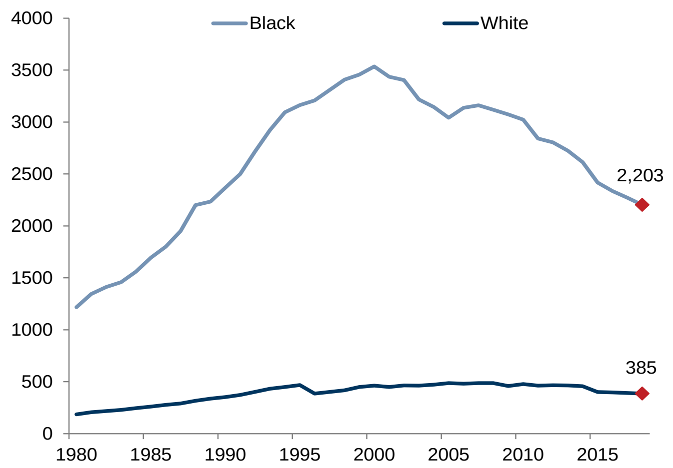
Adults 25+ who have completed four years of college or more, %



Source: US Census Bureau, Goldman Sachs Global Investment Research.

Black men are incarcerated at significantly higher rates…

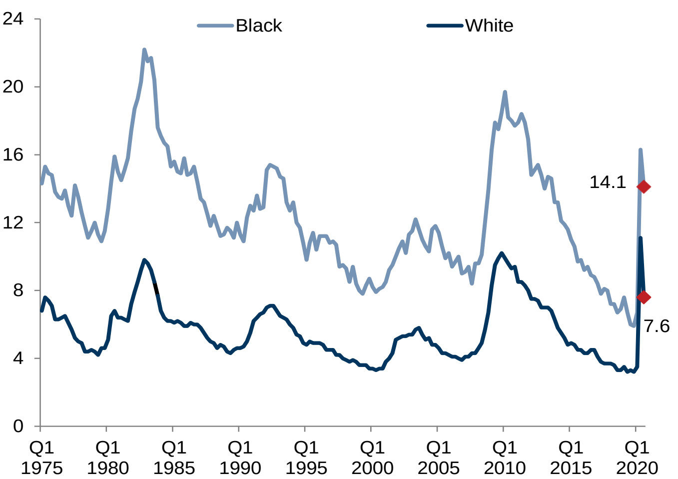
Number of male prisoners serving 1+ years per 100k residents



Note: Prisoners under state and federal jurisdiction; post-1996 figures exclude prisoners of Hispanic ethnicity; post-2003 figures exclude persons of 2+ races.
Source: US Bureau of Justice Statistics, Goldman Sachs GIR.

…and are unemployed at higher rates than white men

Unemployment rates for males 16+, %



Source: US Bureau of Labor Statistics, Haver, Goldman Sachs GIR.

COVID-19: Where We Go From Here

> One world leader asked me if what they had been told about viral spread was true—that viruses are like copier cartridges and just run out of ink at some point. Viruses don't just run out of ink."
>
> **– Dr. Marc Lipsitch, Professor, Harvard School of Public Health**

Published: August 13, 2020

Where we stand now:

- **Vaccinations have begun.** Inoculation of the highest risk groups has begun in the UK, US and Canada after these countries recently approved the Pfizer-BioNTech vaccine for emergency use. This approval followed Phase III results for this vaccine (and further endorsement of the safety and efficacy of the vaccine by the FDA in the US), as well as other top candidate vaccines. Phase III data was at the more positive end of expectations, with the trials showing a high efficacy in reducing symptomatic cases for Pfizer-BioNTech (95%), Moderna (94.1%), Gamaleya (91.4%), AstraZeneca (62-90% based on regimen), and Sinopharm (86%). The EU is expected to approve the Pfizer-BioNTech vaccine in the near term. And the Moderna vaccine is also expected to gain approval in the US in coming days and in the EU in the next week (see page 21 for an update on candidate vaccines.)

- **Odds of widespread vaccination have risen.** The "Superforecasters" from the Good Judgment project see 96% odds that enough doses will be distributed to vaccinate 200mn people in the US by the end of Q3, up from just 27% at the beginning of November.

- **The US, UK, Russia and China are well positioned to benefit from early vaccines…** Of the two leading early vaccine candidates in the West, Pfizer-BioNTech and Moderna, the former is expected to deliver up to 25mn treatments (2 doses each) globally and the latter 10mn treatments (2 doses each) to the US and an undisclosed amount ex-US before the end of the year. Meanwhile, Chinese authorities say they expect to produce 300mn treatments in the same period.

- **…but low vaccine demand could slow achieving herd immunity.** While 73% of people globally say they are interested in taking a vaccine once it becomes available, vaccine demand trends somewhat lower in many DMs. In the US, the UK, and Japan, 62% of survey participants said they would be willing to be vaccinated within a year of a vaccine becoming available, and in the EU that number is 64%. Around half of adults globally said they would take a vaccine within the first 3 months after it becomes available.

- **Positive vaccine news has caused investor re-risking and cyclical rotation.** Since the Pfizer-BioNTech efficacy announcement, the S&P 500 has rallied by 5% to reach an all-time high and the Russell 1000 Value index is up 10%. The MSCI World index is up 7% over the same period. Investor sentiment has turned decidedly more bullish, pushing our GS Risk Appetite Indicator back into positive territory.

What to look for in 2021 (and beyond):

- **A vaccine to the rescue.** We expect large shares of the population to be vaccinated by mid-2021 in all major DMs. Specifically, we believe 50% of the population will likely be vaccinated by April in the US and UK, May in Canada, June in the EU and Australia, and July in Japan. And in EMs, we think most large countries should reach 50% vaccination in 2H21. In particular, we expect 50% of the population will likely be vaccinated in Russia by July, Brazil in August, China and Mexico in October, and India in December. Overall, we find that achieving production targets of the top 10 developers would allow enough doses to be delivered to vaccinate 85% of the world's population next year. Taken together, this supports our view that widespread immunization should lead to a strong pickup in growth in 2021.
- **Still-further cyclical upside.** Despite the recent moves higher in risky assets, we remain firmly pro-cyclical in orientation heading into next year, and expect higher equity and commodity prices, cyclical outperformance within equity markets, steeper curves and a weaker Dollar. But given that markets have now reached targets we'd laid out ahead of positive vaccine news, we are especially focused on areas where we still see more room for the recovery to be reflected, which include commodities, commodity-related assets in FX, US breakeven inflation, EM assets and USD weakness.
- **A strong year for global equity markets.** An acceleration in the global economy and profits in 2021 and 2022 should provide a supportive backdrop for equity markets overall. We forecast strong returns for global equity markets next year. Across regions, we expect price returns of 16% for the S&P 500, 8% for the MXAPJ, 9% for the STOXX 600 and 5% for the TOPIX. Given our expectation for stronger growth, steeper yield curves, and higher commodity prices, we think the conditions are in place for a continued rotation toward Cyclical and Value areas of the market, and recommend more diversification across sectors and factors as a result.

Thanks to: GS Global Economics Research, GS Equity Strategy Research, GS FX and EM Strategy Research, and GS US Biotechnology Equity Research.

Update: Vaccines to the rescue

Vaccine Frontrunners: Progress			
Company	**Trial Status**	**Latest Results**	**Regulatory Approval**
Pfizer - BioNTech	Phase III Complete	**Efficacy:** 95% **Endpoint:** Symptomatic Cases (162 in placebo, 8 in drug) **Timing:** 1 week after 2nd dose **Severe Cases:** 9 in placebo, 1 in drug* **Elderly:** Efficacy 94.7% for ages 65+ **Extra:** Efficacy of 95.4% for at those at risk	**Emergency Approval:** US, UK, Canada, Mexico, and Singapore **EU:** EMA expected to provide a Conditional Marketing Authorization as early as December 23
Moderna	Phase III Complete **Extra:** Started a new 3,000 participant trial for ages 12-17	**Efficacy:** 94.1% **Endpoint:** Symptomatic Cases (185 in placebo, 11 in drug) **Timing:** 2 weeks after 2nd dose **Severe Cases:** 30 in placebo, 0 in drug **Elderly:** Efficacy of 86.5% for ages 65+ **Duration:** Antibody levels remained elevated 90-days after second dose	**US:** FDA will meet on December 17 **EU:** EMA will provide an opinion on Conditional Marketing Authorization likely by January 12th
AstraZeneca	**Size:** 50k **Enrollment:** 23k **Events:** 131 **Extra:** Dropped children sub-group from trials	**Efficacy:** 70% (90% w/ half-full dose, 62% w/ full-full dose) **Endpoint:** Symptomatic Cases **Severe Cases:** None in drug arm **Elderly:** Nobody 55+ in half-full dose arm **Transmission:** Suggestive reduction	**UK:** Seeking approval **India:** Requests additional data **US:** Awaits results from its domestic trial due in January
Gamaleya	**Size:** 40k **Enrollment:** 26k **Events:** 78 **Extra:** Planning joint trial with AstraZeneca to start by end of year	**Efficacy:** 91.4% **Endpoint:** Cases (62 in placebo, 16 in drug) **Timing:** 3 weeks after 1st dose **Severe Cases:** 20 in placebo, 0 in drug	**Russia:** Registered on August 11 for emergency use **Elsewhere:** Awaits trial data
Sinopharm	**Size:** 32k	**Efficacy:** 86% **Endpoint:** Covid-19 infection **Severe Cases:** 100% effectiveness in preventing moderate and severe cases **Extra:** 99% seroconversion rate of neutralizing antibodies	**Emergency Approval:** United Arab Emirates and Bahrain

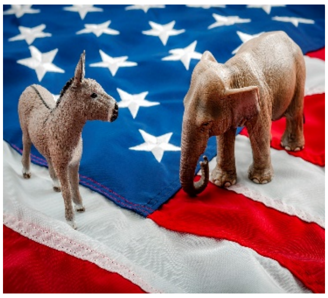
*The only severe case in the Pfizer-BioNTech drug arm was not hospitalized and only reached 93% blood oxygen levels, the minimum to qualify as severe.

Vaccine Challengers: Progress		
Company (Phase)	**Trial Status**	**Phase III**
Novavax (III)	**UK Trial:** Fully enrolled 15k participants **US/Mexico Trial:** Postponed again to start in December	Interim analysis expected in 2021Q1
Johnson & Johnson (III)	**Single Dose Trial:** 38k enrolled so far out of a target of 40k participants **Double Dose Trial:** Started on Nov 15 and will target 30k participants	Completion expected in January or February
CureVac (III)	**Phase IIb/III:** Initiated in December in EU and Latin America (target of 4k/32.5k in Phase IIb/III across both geographies)	Phase III to initiate once ~1k Phase IIb subjects have ~1 week follow-up post first dose
Sanofi - GSK (II)	**Phase I/II:** Interim results showed an insufficient immune response in older adults **Next Steps:** Company now plans a new phase 2b study with an improved antigen formulation	Expected to start in 2021Q2

Note: Data as of December 15, 2020.

Thanks to: Daan Struyven and Daniel Milo.

Beyond 2020: Post-Election Policies



"I don't think US tariffs on China would just come off under Biden; China would have to provide something in return."

– Ian Bremmer, President and Founder, Eurasia Group

Published: October 1, 2020

Where we stand now:

- **Former Vice President Joe Biden was elected President, but there was no blue wave.** Despite much rhetoric and market-based predictions around control of the Senate flipping and Democrats picking up more seats in the House, the balance of power in the Senate currently stands at 50-48 in favor of Republicans, and Democrats' majority in the House looks set to be their tightest since WWII, with the balance as of now 222-211. Democrats also failed to pick up any state legislative chambers, putting the party at a disadvantage in the congressional and legislative redistricting process that begins next year.
- **All eyes (and money) are on Georgia.** The Democrats' last hope for the Senate majority rests on the outcome of Georgia's two Senate races in which no candidate received more than 50% of the vote, sending both elections into a runoff election set for January 5, 2021. While Republican candidates appear to have won more votes than Democratic candidates in both Senate races, the outcome of the runoff elections remains fairly uncertain, with prediction markets placing the odds of Democrats winning both races at roughly 30%.
- **Equities rose and the market rotated on the likelihood of divided government, but some of these shifts have reversed.** The S&P 500 rose by 4% in the days following the election, and many of the popular Democratic sweep trades fell while positions likely to benefit from a divided government rallied sharply. Cyclical sectors like Materials and Financials underperformed the day following the election, while secular growth sectors—including Tech and Communication Services—outperformed. But, some of these trends subsequently reversed, as Materials and Industrials rallied again, and market focus turned to vaccine developments (see page 20 for the equity impact of vaccine headlines).
- **The size and timing of an additional fiscal stimulus package remain uncertain.** We note that congressional leaders are negotiating a fiscal stimulus package reportedly in the $900bn range, which could pass in the next few days. We believe this is likely to be the last substantial COVID-relief package unless Democrats win both Senate seats in the Georgia runoff elections.
- **A number of major economic appointments have been announced.** Experience and diversity have so far played important roles in Biden's economic appointments. Former Fed Chair Janet Yellen has been nominated for Treasury Secretary, labor economist Cecilia Rouse has been nominated for Chair of the Council of Economic Advisers, and Brian Deese will serve as director of the National Economic Council.

What to look for in 2021 (and beyond):

- **The outcome of the Georgia Senate races, which will determine the Senate majority, and, in turn, Biden's ability to pass his agenda.** If Republicans keep the Senate as prediction markets currently expect, we believe much of President-elect Biden's agenda would be unlikely to pass, including his proposed tax increases, as well as most of his longer-term spending initiatives. But if Democrats manage to secure the majority, we would not only expect more near-term fiscal stimulus, but also some longer-term spending and tax increases, although the very slim majority would still likely limit progress in other areas.
- **Material shifts in trade and regulatory policy**. Even if Republicans keep the Senate majority, we still expect significant changes to trade and regulatory policy, which can be largely implemented through executive action. We think that tariffs on Chinese goods will likely decline over the medium term, and expect significant changes to environmental, labor, and healthcare regulation, among other areas, with Biden likely to issue executive orders to counter Trump's actions on climate within his first 100 days.
- **Still-strong growth, cyclical market upside and Dollar weakness.** Under our baseline of divided government, we still expect above-consensus US growth of 5.3%, cyclical market upside and further Dollar depreciation in 2021 (see pages 10-11, 20, and 24-25). But should the Senate flip Democrat, we'd expect even greater moves in these directions.

Thanks to: GS US Economics Research, GS US Equity Strategy Research and GS Markets and FX Strategy Research.

Update: Biden wins, but agenda in doubt

Biden's ambitious campaign proposals below now look much less likely to be implemented given the likelihood that Republicans keep the Senate majority. We now expect the administration to focus more on areas where executive action can make a significant impact, including trade, environmental, labor, and healthcare regulation, among other areas.

Personal Tax	Corporate Tax
• Increase top individual tax rate for taxpayers with incomes above $400K to 39.6% from 37% • Tax long-term capital gains and qualified dividends at the ordinary income tax rate for incomes above $1mn • Impose payroll tax on wages earned above $400K • Cap the value of itemized deductions for high earners • Phase out business income deduction above $400K • Increase 401(k)/IRA incentives • Expand a number of tax credits including the Earned Income Tax Credit for childless workers aged 65+ and renewable-energy tax credits for individuals	• Increase the corporate income tax rate from 21% to 28% • Increase the tax rate on Global Intangible Low Tax Income (GILTI) earned by foreign subsidiaries of US firms from 10.5% to 21% • Impose a minimum 15% tax on US-based corporations with a book profit of $100mn or higher • Offer a Manufacturing Communities Tax Credit to businesses that experience large workforce layoffs • Expand the New Market Tax credit for investment in low-income, distressed communities • Provide tax credits to small businesses for adopting workplace retirement savings plans
Trade	**Infrastructure**
• Increase federal spending on goods made by US workers by $400bn • Take aggressive enforcement actions against China and rally US allies to pressure China and other trade abusers • Confront foreign efforts to steal US intellectual property • Establish a "claw back" provision to force companies to return public funds when they move jobs overseas	• Create a $2tn clean energy and infrastructure fund to be deployed during the first term with a focus on transportation funding • Invest $300bn in domestic R&D to improve US systems (clean energy, public health, telecoms and infrastructure) and promote domestic production • Expand broadband, or wireless broadband via 5G, to all
Labor	**Policing/Criminal**
• Raise federal minimum wage to $15/hour and index to the median hourly wage • Ban state-level "right to work" laws • Establish a federal right to union organizing and collective bargaining for all public sector employees	• Promote community-oriented policing • Expand the power of the US DOJ to address misconduct in police departments and prosecutors' offices • End mandatory minimums End all incarceration for drug use alone
Healthcare	**Education**
• Provide individuals with the ability to purchase a public health insurance option like Medicare • Eliminate income-level cap on tax credits for individuals purchasing insurance on government exchanges and lower the limit on the cost of coverage • Lower the Medicare eligibility age from 65 to 60 • Allow for direct Medicare negotiation of drug prices • Spend $125bn over 10 years to scale up drug addiction treatment and other prevention and recovery programs	• Provide grants to states that want to eliminate tuition at public colleges and universities for students from families with <$125K in income • Offer free tuition at all community colleges • Create universal pre-K • Double the size of the maximum Pell Grant award • Offer public servant loan forgiveness • Make income-based repayment of student loans more generous • Increase K-12 education funding for low-income schools
Immigration	**Energy**
• Establish a roadmap to citizenship for unauthorized migrants currently in the US • End the practices of keeping immigrants in long-term detention, separating families, and conducting large-scale raids to arrest unauthorized migrants already living and working in the US • Reinstate the DACA program • Increase the number of employment-based visas granted each year and eliminate country-based quotas • Raise yearly cap on refugees admitted to the US to 125K • Reverse the expansion of the "public charge" rule	• Achieve carbon neutrality in the US by 2050 • Achieve a carbon-pollution free power sector by 2035 • Rejoin the Paris Climate Accord and rally other nations to increase their emissions reduction targets • Impose a carbon adjustment fee against countries that are failing to meet their climate and environmental obligations • Expand several renewable-energy tax credits and end subsidies for fossil fuels • Invest in the US automobile infrastructure, including 500K electric vehicle charging stations • Upgrade 4mn buildings/weatherize 2mn homes in 4 years

Source: Campaign documents, multiple media sources, Tax Foundation, Tax Policy Center, Committee for a Responsible Federal Budget, Peterson Institute for International Economics, Brookings Institute, Goldman Sachs Global Investment Research.

What's In Store For The Dollar

"It's not just the rate of global growth that matters for the Dollar's value, it's how global growth compares to US growth. Even if the global economy is recovering, if US growth outpaces global growth, the Dollar will remain supported."

– Barry Eichengreen, Professor, University of California, Berkeley

Published: October 29, 2020

Where we stand now:

- **The election result, as well as positive vaccine news, has led to sharp Dollar depreciation.** The trade-weighted Dollar weakened by 0.6% the day after Joe Biden's presidential victory amid the likelihood of a divided Congress—mainly due to gains in CNH and several EM crosses. With the election result in hand, market attention turned back to the pandemic, and the Dollar has fallen sharply as positive vaccine developments have lifted confidence in the global growth outlook. Although the value of the Dollar has declined, we estimate that it is still meaningfully overvalued by just under 10% on standard metrics.
- **The Dollar's share of global payments has declined slightly, but the Dollar remains the top funding and trade currency.** The share of cross-border payments via SWIFT settled in USD declined to 41.7% in October as the Euro's share rose to 38.5%. But the Dollar remained the top currency for global trade, as well as the top funding currency, with about half of all cross-border loans and international debt securities denominated in dollars.

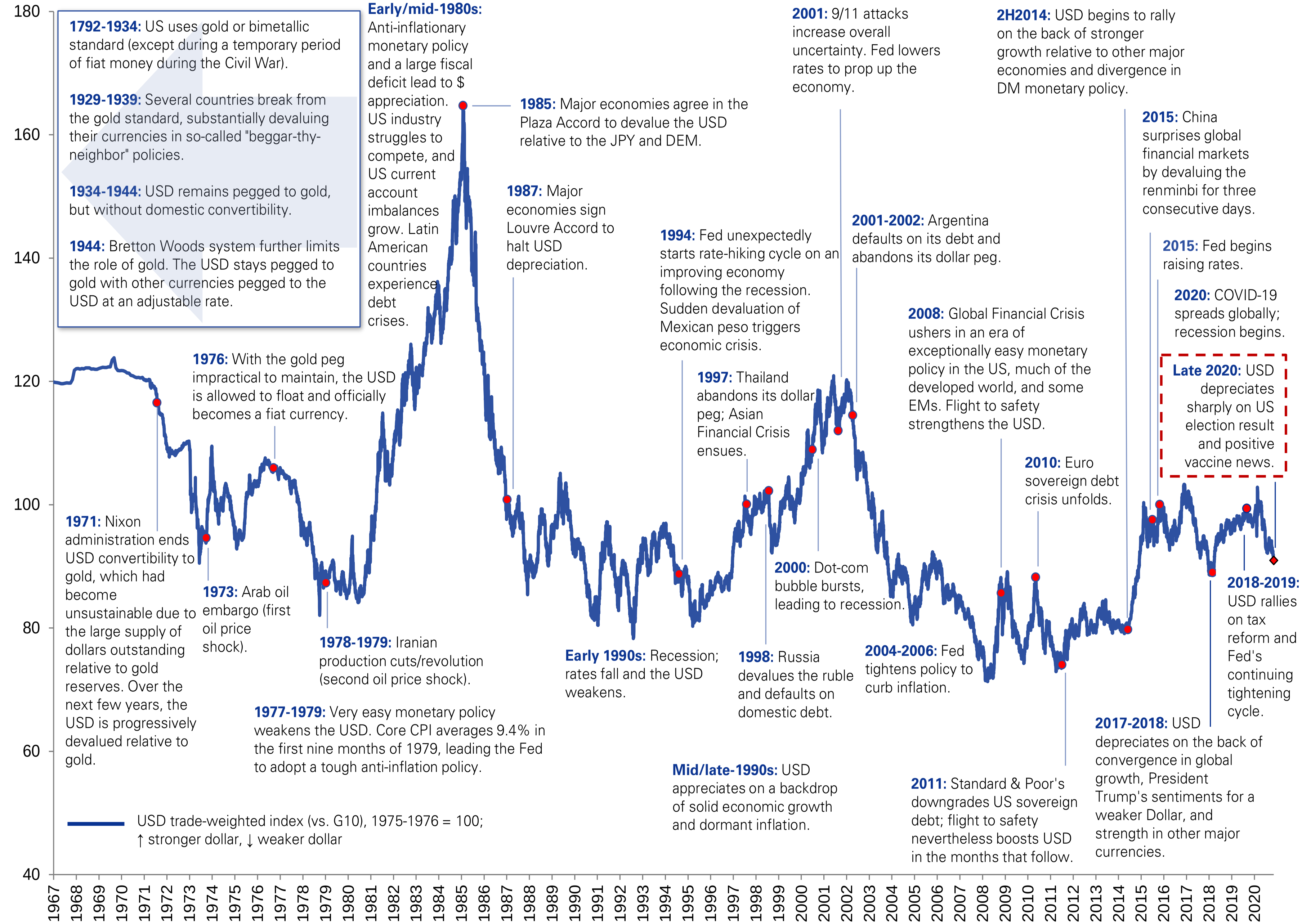
What to look for in 2021 (and beyond):

- **Continued trend depreciation in the broad Dollar.** We continue to expect that the substantial overvaluation of the Dollar, the Fed's commitment to keeping rates low to help generate higher inflation, and a relatively steep upward trajectory for the global economy coming out of the coronavirus recession will lead to further Dollar depreciation over the next several years. We forecast a 6% decline in the broad trade-weighted Dollar index over the next 12 months, with risks skewed toward an even weaker Dollar. To position for this, we recommend US Dollar shorts against AUD and CAD in G10 currencies, MXN, ZAR, and INR in EM currencies, and CNY via unhedged 3yr CGBs. Longer-term, we forecast a 15% real depreciation from the Dollar's 2020 peak to year-end 2024, with risks skewed toward more Dollar downside.
- **Potential increased Fed focus on the Dollar.** We believe that the announcement of former Fed Chair Janet Yellen as the next Treasury secretary suggests that the incoming Biden administration may focus more on the macroeconomic effects of currency fluctuations, rather than just continuing with the "strong Dollar" policy of previous administrations.
- **Long-term headwinds, but continued support for the Dollar's role as a global currency.** Concerns around the Dollar's economic size, economic stability, and geopolitical alignment all point to a likely decline in the Dollar's share of global reserves over time, and we believe the pursuit of de-Dollarization by some countries will likely persist. But given the Dollar's outsized role in global trade and a lack of alternatives to the US's deep, open capital markets, we think sovereigns and other currency investors will continue to struggle to find meaningful substitutes for the Dollar. As a result, the Dollar's status as an international currency is likely to remain supported for some time.
- **Strength in the Chinese Renminbi, as well as possible further RMB internationalization.** We believe that strong macro fundamentals and flow dynamics justify further strength in CNY. On the macro front, we forecast Chinese GDP growth of 8.0% yoy in 2021. And on the currency front, attractive yields should lead to continued portfolio inflows into Chinese government bonds. We therefore believe that the RMB will continue to participate in a broad Dollar down move, and forecast a 12m USD/CNY target of 6.30. In terms of internationalization, recent communications from Chinese policymakers imply that they may further liberalize cross-border RMB flows and ease restrictions on the capital account in both directions. Together with the large-scale tests that are being conducted of a sovereign digital currency—which aims to lower transaction costs and eventually reduce dependence on US Dollar systems for cross-border payments—we believe this could increase the appeal of the RMB as an international currency.
- **A larger global role for the Euro.** We believe the actions of European policymakers will continue to play an important role in the Euro's path as an international currency. On the fiscal side, we believe officials' efforts to further integrate sovereign credit risks through the EU Recovery Fund represents an important step in encouraging inflows from international investors and boosting the Euro's global role. And on the monetary side, we think the ECB's actions over the course of 2020 to backstop sovereign credit spreads have played a crucial role in supporting the currency.
- **Further progress on Central Bank Digital Currencies (CBDCs).** Most CBDCs will remain on the drawing board or in testing phases in the near term as policymakers globally iron out technical issues related to issuing a digital currency. But with central banks representing a fifth of the world's population planning to issue a general-purpose CBDC in the next three years, we believe the implications of CBDCs for banking systems and macroeconomic policy will eventually become reality.

Thanks to: GS FX Strategy Research and GS Asia Economics Research.

Update: The USD has fallen sharply

History of the US Dollar



Source: Bloomberg, Federal Reserve Board, Congressional Research Service, various news sources, Goldman Sachs Global Investment Research.

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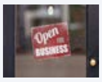
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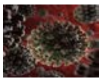
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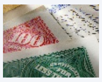
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February 5, 2018


Special Issue
2017 Update, and a Peek at 2018
December 14, 2017


Issue 63
Late-Cycle for Longer?
November 9, 2017

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Summary of our key forecasts

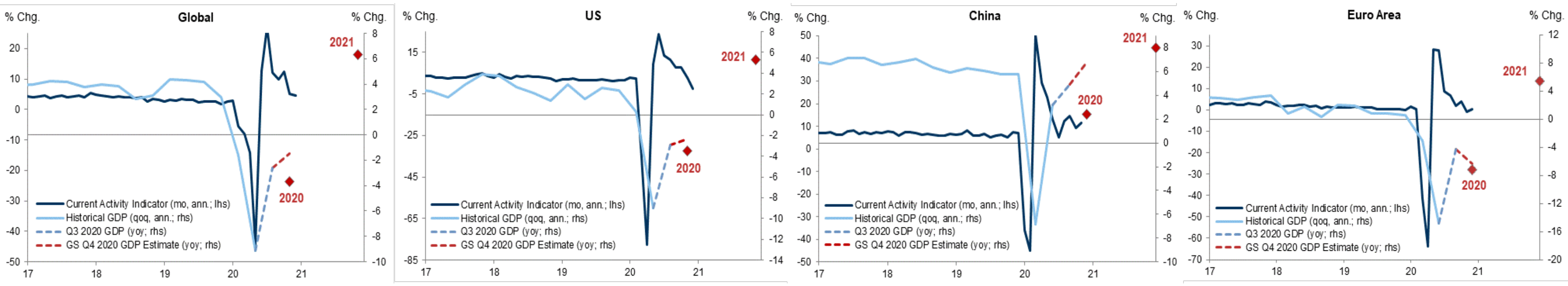
GS GIR: Macro at a glance

Watching

- **Globally,** after a pandemic-induced contraction of an estimated 3.7% in 2020, we expect above-consensus global growth of 6.3% in 2021. Our optimism reflects the view that widespread immunization next year, accommodative monetary and fiscal policy, and limited scarring effects will support a continued recovery in economic activity, though the recent rise in virus cases is likely to trigger a period of softer growth this winter.
- **In the US,** we expect virus resurgence to weigh on activity through January, though services activity has proven more resilient than expected. We expect a large rebound in 1H21 on the back of widespread immunization—with 50% of the population expected to be vaccinated by April—and forecast above-consensus 5.3% growth in 2021. We expect the unemployment rate to fall to 5.2% and core PCE inflation to rise to 1.6% by year-end 2021.
- **The Fed** has adopted flexible average inflation targeting and outcome-based forward guidance, which we view as consistent with our expectation of liftoff around early 2025. The Fed has also adopted outcome-based forward guidance for asset purchases, committing to maintain them "until substantial further progress has been made toward the Committee's maximum employment and price stability goals." On the fiscal policy front, congressional leaders are currently negotiating a COVID-relief bill that is reportedly in the $900bn range, which could be passed in the next few days.
- **In the Euro area,** we expect a 2.1% qoq non ann. decline in real GDP in 4Q20 and 0.9% qoq non ann. growth in 1Q21 as countries continue to contend with virus spread, but see a sharp pickup in growth from Q2 on likely widespread vaccinations. We expect full-year growth of -7.2% and 5.5% in 2020 and 2021, respectively.
- **We expect the ECB** to adopt a symmetric 2% inflation aim but include "soft" elements of Average Inflation Targeting (AIT) by placing some emphasis on persistent inflation misses when the strategy review concludes next year. Given the subdued inflation outlook, we expect the ECB will keep rates on hold until 2H25. We expect the EUR 750bn Recovery Fund, which will provide fiscal support to the countries most affected by the virus, to be operational early next year.
- **In China,** we expect 2020 real GDP growth of 2.4% yoy, making China the only major economy to post positive real GDP growth this year. We expect 2021 real GDP growth of 8.0% yoy, reflecting a slightly more cautious view than consensus, based on our belief that policymakers will focus on policy normalization and the achievement of higher-quality growth next year.
- **WATCH CORONAVIRUS.** While the trajectory of the coronavirus remains highly uncertain, our base case assumes that the path of new infections and fatalities will not prevent a continued recovery in global economic activity in 2021. With the recent vaccine approvals and the start of vaccinations in the UK, Canada, and the US, we expect most DMs to vaccinate 50% of their populations by late 2Q21 and EMs to follow by late 2021.

Goldman Sachs Global Investment Research.

Growth



Source: Haver Analytics and Goldman Sachs Global Investment Research.
Note: GS CAI is a measure of current growth. We have recently revised our methodology for calculating this measure. For more information on the methodology of the CAI please see "Lessons Learned: Re-engineering Our CAIs in Light of the Pandemic Recession," Global Economics Analyst, Sep. 29, 2020.

Forecasts

Economics

GDP growth (%)	2020 GS	2020 Cons.	2021 GS	2021 Cons.
Global	-3.7	-3.8	6.3	5.2
US	-3.5	-3.5	5.3	3.9
China	2.4	2.0	8.0	8.2
Euro area	-7.2	-7.4	5.5	4.6

Policy rates (%)	2020 GS	2020 Mkt.	2021 GS	2021 Mkt.
US	0.13	0.11	0.13	0.13
Euro area	-0.50	-0.55	-0.50	-0.56
China	2.20	2.80	2.25	2.96
Japan	-0.10	-0.06	-0.10	-0.09

Markets

Interest rates 10Yr (%)	Last	E2020	E2021
US	0.92	0.75	1.30
Germany	-0.57	-0.60	-0.40
Japan	0.01	0.00	0.10
UK	0.28	0.20	0.50

FX	Last	3m	12m
EUR/$	1.22	1.17	1.25
GBP/$	1.35	1.34	1.44
$/JPY	104	103	100
$/CNY	6.52	6.50	6.30

Commodities	Last	3m	12m
Crude Oil, Brent ($/bbl)	51	47	63
Nat Gas ($/mmBtu)	2.7	3.25	2.75
Copper ($/mt)	7,814	8,200	9,500
Gold ($/troy oz)	1,852	2,300	2,300

Credit (bp)		Last	E2020	E2021
USD	IG	102	110	100
	HY	379	400	340
EUR	IG	101	105	96
	HY	352	385	330

Equities

S&P 500	E2020 GS	E2020 Cons.	E2021 GS	E2021 Cons.
Price	3,700	--	4,300	--
EPS	$136	$138	$175	$169
Growth	-17%	-16%	29%	22%

Returns (%)	12m	YTD	E2020 P/E
S&P500	16.0	15.0	27.3x
MXAPJ	8.0	23.0	20.5x
Topix	5.0	7.0	21.3x
STOXX 600	9.0	-6.0	24.6x

Consumer	2020 CPI (%, yoy)	2020 Unemp. Rate	2021 CPI (%, yoy)	2021 Unemp. Rate
US	1.1	6.7	1.9	5.2
Euro area	0.3	9.1	0.9	9.9
China	2.7	--	1.1	--

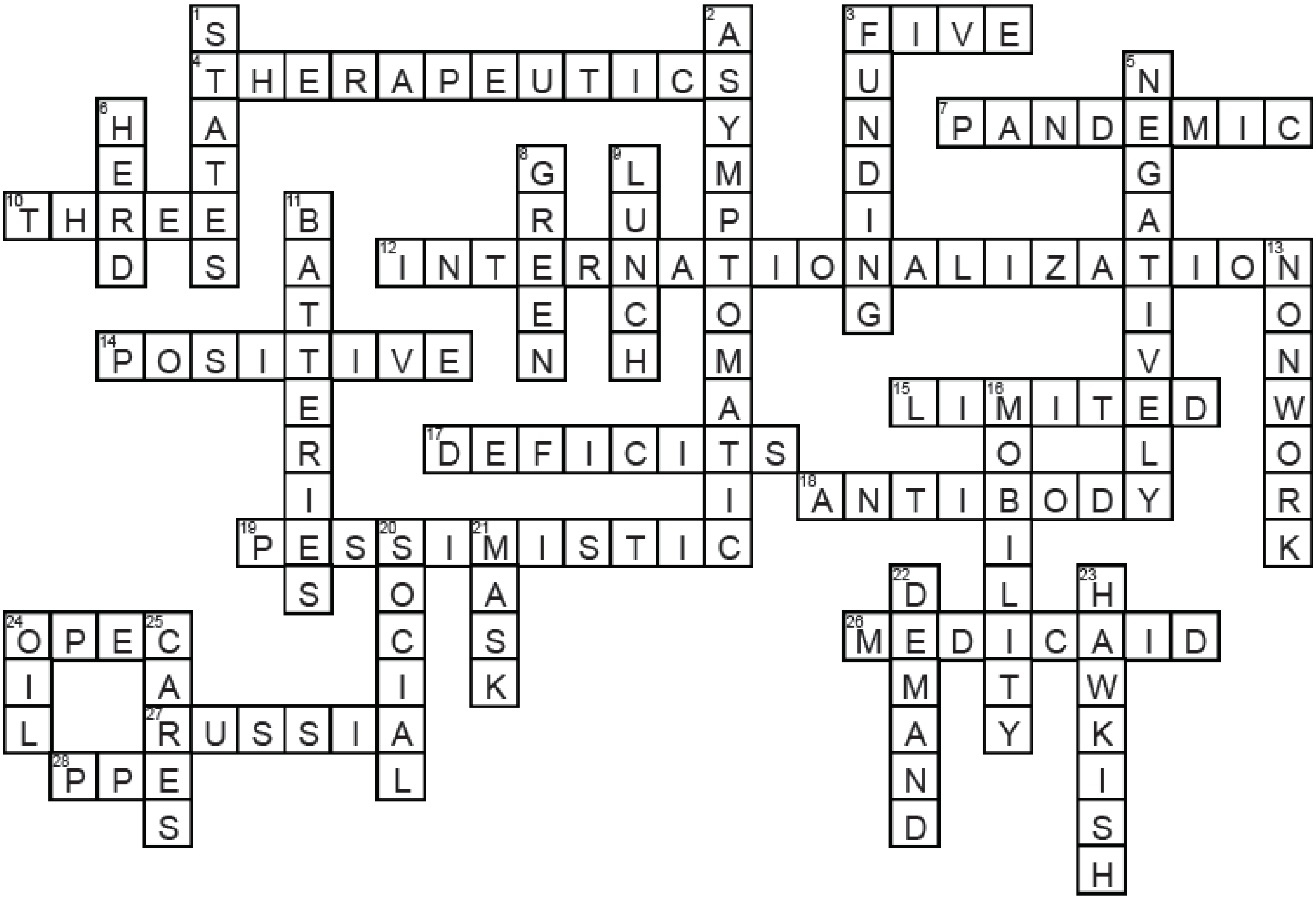
Wage Tracker 2020 (%)	Q1	Q2	Q3
US	3.6	5.8	4.7
Euro area	1.7	--	--
China	-2.0	-0.6	3.0

Source: Bloomberg, Goldman Sachs Global Investment Research. For important disclosures, see the Disclosure Appendix or go to www.gs.com/research/hedge.html.

Market pricing as of December 16, 2020.

Puzzle solutions

Crossword from pg. 4 of this report:



Puzzle made at www.puzzle-maker.com.

Glossary of GS proprietary indices

Current Activity Indicator (CAI)

GS CAIs measure the growth signal in a broad range of weekly and monthly indicators, offering an alternative to Gross Domestic Product (GDP). GDP is an imperfect guide to current activity: In most countries, it is only available quarterly and is released with a substantial delay, and its initial estimates are often heavily revised. GDP also ignores important measures of real activity, such as employment and the purchasing managers' indexes (PMIs). All of these problems reduce the effectiveness of GDP for investment and policy decisions. Our CAIs aim to address GDP's shortcomings and provide a timelier read on the pace of growth.

For more, see our CAI page and Global Economics Analyst: Trackin' All Over the World – Our New Global CAI, 25 February 2017.

Dynamic Equilibrium Exchange Rates (DEER)

The GSDEER framework establishes an equilibrium (or "fair") value of the real exchange rate based on relative productivity and terms-of-trade differentials.

For more, see our GSDEER page, Global Economics Paper No. 227: Finding Fair Value in EM FX, 26 January 2016, and Global Markets Analyst: A Look at Valuation Across G10 FX, 29 June 2017.

Financial Conditions Index (FCI)

GS FCIs gauge the "looseness" or "tightness" of financial conditions across the world's major economies, incorporating variables that directly affect spending on domestically produced goods and services. FCIs can provide valuable information about the economic growth outlook and the direct and indirect effects of monetary policy on real economic activity.

FCIs for the G10 economies are calculated as a weighted average of a policy rate, a long-term risk-free bond yield, a corporate credit spread, an equity price variable, and a trade-weighted exchange rate; the Euro area FCI also includes a sovereign credit spread. The weights mirror the effects of the financial variables on real GDP growth in our models over a one-year horizon. FCIs for emerging markets are calculated as a weighted average of a short-term interest rate, a long-term swap rate, a CDS spread, an equity price variable, a trade-weighted exchange rate, and—in economies with large foreign-currency-denominated debt stocks—a debt-weighted exchange rate index.

For more, see our FCI page, Global Economics Analyst: Our New G10 Financial Conditions Indices, 20 April 2017, and Global Economics Analyst: Tracking EM Financial Conditions – Our New FCIs, 6 October 2017.

Goldman Sachs Analyst Index (GSAI)

The US GSAI is based on a monthly survey of GS equity analysts to obtain their assessments of business conditions in the industries they follow. The results provide timely "bottom-up" information about US economic activity to supplement and cross-check our analysis of "top-down" data. Based on analysts' responses, we create a diffusion index for economic activity comparable to the ISM's indexes for activity in the manufacturing and nonmanufacturing sectors.

Macro-Data Assessment Platform (MAP)

GS MAP scores facilitate rapid interpretation of new data releases for economic indicators worldwide. MAP summarizes the importance of a specific data release (i.e., its historical correlation with GDP) and the degree of surprise relative to the consensus forecast. The sign on the degree of surprise characterizes underperformance with a negative number and outperformance with a positive number. Each of these two components is ranked on a scale from 0 to 5, with the MAP score being the product of the two, i.e., from -25 to +25. For example, a MAP score of +20 (5;+4) would indicate that the data has a very high correlation to GDP (5) and that it came out well above consensus expectations (+4), for a total MAP value of +20.

Disclosure Appendix

Reg AC

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